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A COMPARISON OF THE AIR FORCE INSTITUTE
OF TECHNOLOGY GRADUATE TRANSPORTATION
CURRICULUM TO SIMILAR CURRICULA OFFERED
BY CIVILIAN INSTITUTIONS

THESIS

Roger G. Brooks
Captain, USAF

AFIT/GLM/LSM/89S-4

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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A COMPARISON OF THE AIR FORCE INSTITUTE OF
TECHNOLOGY GRADUATE TRANSPORTATION CURRICULUM TO SIMILAR
CURRICULA OFFERED BY CIVILIAN INSTITUTIONS

THESIS

Presented to the Faculty of the School of Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Roger G. Brooks, B.S.

Captain, USAF

September 1989

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Acknowledgements

I am indebted to a number of individuals for their valuable contribution to this thesis. My sincere thanks are given to Lieutenant Colonel Robert Trempe, my thesis advisor. The enthusiasm and patience he displayed during the preparation of this thesis were greatly appreciated. My thanks to the past and present Air Force Institute of Technology transportation faculty members which gave of their valuable time and agreed to be interviewed. The faculty members interviewed are: Tom Harrington, Option Manager 1981-83; Jim Annesser, Option Manager 1983-86; Rick Clarke, Course Director 1985-88; Kent Gourdin, Option Manager 1986-88; and Robert McCauley, Course Director 1988-Present.

A special word of thanks goes to my wife, Judy. Her support, patience, and understanding made this thesis effort possible.

Roger G. Brooks

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Abstract

The Directorate of Transportation, at HQ USAF, requested a thesis effort be put forth to research certain questions about the curriculum of the Transportation Management Option of the Graduate Logistics Management degree. These questions involve the appropriateness of the current curriculum in regard to the transportation environment of the 1990s and how the AFIT transportation curriculum compares with the transportation curriculum of graduate civilian institutions.

Interviews were conducted with the six individuals who have served as the Transportation Option Manager or Transportation Course Director since the program was founded. The purpose of the interviews was to determine what skills the Air Force transportation officer needs to operate in the environment of the 1990s. Results of the interviews suggest greater emphasis on: management information and decision support systems; financial analysis and cost accounting; verbal and written communication skills; general problem solving skills; and contract negotiation skills.

A content analysis was performed on the curriculum offerings of eight major civilian transportation schools and the findings were compared to the AFIT transportation

curriculum. The study reveals most civilian institutions offer a MBA degree, while AFIT offers a MS degree in Transportation. Consequently, most differences in the AFIT and a civilian institution's curriculum stem from the business orientation of the civilian institutions. However, the following significant trends were noted in the curricula of civilian institutions: management information and decision support systems; financial analysis; and accounting.

The main goal of the thesis is to provide information which is useful in making future AFIT transportation curriculum decisions. In order to accomplish this goal, the research provides a model for the AFIT transportation curriculum of the 1990s, based upon the trends in civilian institutions and the interviews with the AFIT transportation faculty.

A COMPARISON OF THE AIR FORCE INSTITUTE OF TECHNOLOGY
GRADUATE TRANSPORTATION CURRICULUM TO SIMILAR CURRICULA
OFFERED BY CIVILIAN INSTITUTIONS

I. Introduction

General Issue

The Directorate of Transportation, at HQ USAF, requested a thesis effort be put forth to examine certain questions about the curriculum of the Transportation Management Option of the Graduate Logistics Management degree. These questions involve the appropriateness of the current curriculum in regards to the transportation environment of the 1990s and how the AFIT transportation curriculum compares to the transportation curriculum of graduate civilian institutions. These questions evolved from the following significant events.

A briefing presented at the 1987 AF/LE Future Look Conference predicted automation would be one of the key factors influencing Air Force Transportation in the 1990s. Experts in the transportation field expect to see quantum leaps forward in automation, movement toward the paperless environment, and increased use of artificial intelligence. Other factors influencing military transportation include:

decreased budgets, increased competition for resources, continued reliance of ANG/AFRES and civil sector airlift capability, and a manpower move to more generalists and less specialists (19).

Based on the predictions listed above, in February of 1988, the USAF Director of Transportation approved the Air Force Training Master Plan for the 1990s. The following is a list of some of the training strategies stated in the plan:

1. Emphasize the planning and use of automation and electronic data processing systems in transportation operations.
2. Understand the concepts and use the skills that will enable continuing improvement in our services and the productivity of our resources.
3. Define a core of military transportation skills essential for war fighting and incorporate them into all curriculum, as well as provide maximum opportunities for realistic training in the wartime environment.
4. Find innovative, cost effective approaches to meeting training requirements, such as computer based training, to effectively deliver training to our personnel. (18:Atch 2,1)

Background

Transportation was the last logistics career field in the Air Force to have a degree option at AFIT. According to Major Tom Harrington, a member of the AFIT faculty in the early 1980s, the reason for this situation was because "the Pentagon thought it was more appropriate for a

transportation officer to receive a transportation degree at a civilian institution rather than at AFIT" (15). In the Pentagon's opinion, transportation officers needed to be educated in the policies, practices, and procedures of the national transportation sector. The reason for the Pentagon's position on the matter was due to the transportation officer's extensive dealings with the civilian sector. While the Pentagon's argument was valid, others believed that the transportation officer needed an education with the national transportation sector acting as a backdrop or basis for defense transportation applications (15).

Before the inception of the in-residence program, transportation officers seeking a Master's degree with Air Force sponsorship did so through the AFIT Civilian Institution Programs. Sponsored coursework was usually taken at the University of Tennessee at Knoxville.

The Transportation option of the in residence Graduate Logistics Management degree was founded at AFIT in 1981 by Major Harrington. The first class graduated in September 1982. The program normally graduates seven to ten individuals every year (15).

The early Transportation option curriculum developed by Major Harrington was derived from a study he completed which reviewed the curricula of some of the nation's most prominent transportation schools. The curricula studied

included Indiana University, the University of Maryland, the University of Alabama, and the University of Tennessee. The finished curriculum differed from those of the civilian institutions in two important ways. First, the curriculum gave a defense transportation orientation to the common body of knowledge taught by the graduate civilian institutions. Second, the curriculum introduced the transportation officer to the military logistics environment in which the officer must operate (15).

Specific Problem

In order to develop an outline of the AFIT transportation curriculum for the 1990s, it should first be determined where the program is today with respect to other comparable programs. The objective of this thesis will be to answer the question: how does the AFIT Graduate Transportation Management curriculum compare to similar curricula offered by graduate level civilian institutions?

Definitions

The following terms will appear throughout this research study and deserve explanation:

1. Course - the principle subdivision of a curricular program. normal duration of which is a term, quarter, semester, or year. "Courses are assumed to be organized in response to a definite logic as well as to what is

psychologically consistent with student learning" (23:Ch 2,37).

2. Curriculum - refers to what the college or university teaches in formal courses, seminars, tutorials, or independent study. Curriculum is the organized body of information, principles, and theory comprising the program of instruction (23:Ch 2,37).

3. Degree Requirements - the courses or credit hours necessary for the student to obtain before a degree or certificate can be granted. Usually, specific basic courses are required as well as selected courses from a specified list, for a total number of credit hours (23:Ch 2,37).

4. Orientation - is the general direction of a program's curriculum such as policy, economics, engineering, managerial, or multidisciplinary (9:383).

5. Prerequisites - established prior experiences or education that is considered necessary before a student can enroll in course or curricular program, in order for the student to successfully complete the course or program (23:Ch 2,37).

Investigative Questions

The answers to the following investigative questions are vital to determining where the curriculum of the Transportation Option of the AFIT Graduate Logistics

Management program stands today when compared to similar curricula at civilian institutions.

1. Which graduate level civilian curricula should the AFIT Graduate Transportation Management curriculum be compared to?

2. What subjects are currently emphasized in the transportation/logistics curricula of graduate level civilian institutions?

3. To what extent does the AFIT transportation curriculum take into account the changes, (i.e., for example deregulation, computers, and the growth in international trade), that have occurred in the transportation industry during the 1980s?

4. What skills will be needed by transportation/logistics professionals in the environment of the 1990s, according to civilian experts and AFIT transportation/logistics faculty?

Scope

The scope of this research study will be limited to the following considerations:

1. The study will consider only civilian institutions located in the United States, whose curricula offer a major or concentration in transportation/logistics at the graduate level.

2. The only graduate curricula used in the comparison to the AFIT curriculum will be those of the civilian institutions listed in the top ten universities for the number of transportation/logistics courses offered or ranked in the top twenty-five by the number of articles published in professional transportation journals. Additionally, only those institutions which have a graduate enrollment of at least five students will be considered.

Limitations

The research presented in this thesis is constrained by two limitations. First, only 1988 - 1989 or most current Graduate course catalogs will be used to determine the transportation/logistics curricula in use at the selected civilian institutions. The reason for this limitation is due to the dynamic nature of graduate level transportation/logistics curriculum. Research in the area reveals institutions are continually changing their curricula in response to the environment. Therefore, using the most current catalogs represents a "snap-shot" in time of the transportation/logistics curricula offered during the period in which this research was conducted.

Secondly, the research is limited by the reliance on an institution's course title to accurately reflect the contents of that course. Additionally, the actual content of a course in a particular subject area may differ greatly

from one institution to another. For example, a course in financial accounting offered at one institution may vary greatly in content and emphasis from a course with the same title at another institution.

Plan of Presentation

The next chapter (Chapter 2) provides an overview of the factors affecting the curriculum development process and a discussion of the transportation/logistics education literature pertinent to this research effort. Chapter 3 presents an explanation of the methodology used to answer the investigative questions mentioned earlier in this chapter. The findings for each of the investigative questions are summarized in Chapter 4. The information presented in Chapter 4 results in conclusions and recommendations for the AFIT transportation curriculum which are discussed in Chapter 5.

II. Literature Review

Introduction

This chapter describes the factors which influence the the process of curriculum development as it applies to civilian institutions and the Air Force Institute of Technology Transportation Option of the Graduate Logistics Management degree. Furthermore, trends in transportation/logistics education, as ascertained from the literature review of professional journals, are discussed as they apply to this research effort.

Curriculum Development

Before discussing what topics should or should not be included in a transportation/logistics curriculum, it is important to first consider what influences shaped the curriculum. The curricula of civilian institutions are affected by many different individuals or groups. Figure 1 displays the principal groups which impact curriculum development. This model, used by Allan C. Ornstein and Francis P. Hunkins in their book, Curriculum: Foundations, Principles, and Issues, was developed by James B. Macdonald. The model describes the continuous interaction of the groups involved in curriculum activity. The primary groups which impact the curriculum are the: Professional Educator, Scholar-Expert, Teacher, Teacher Organizations, Students,

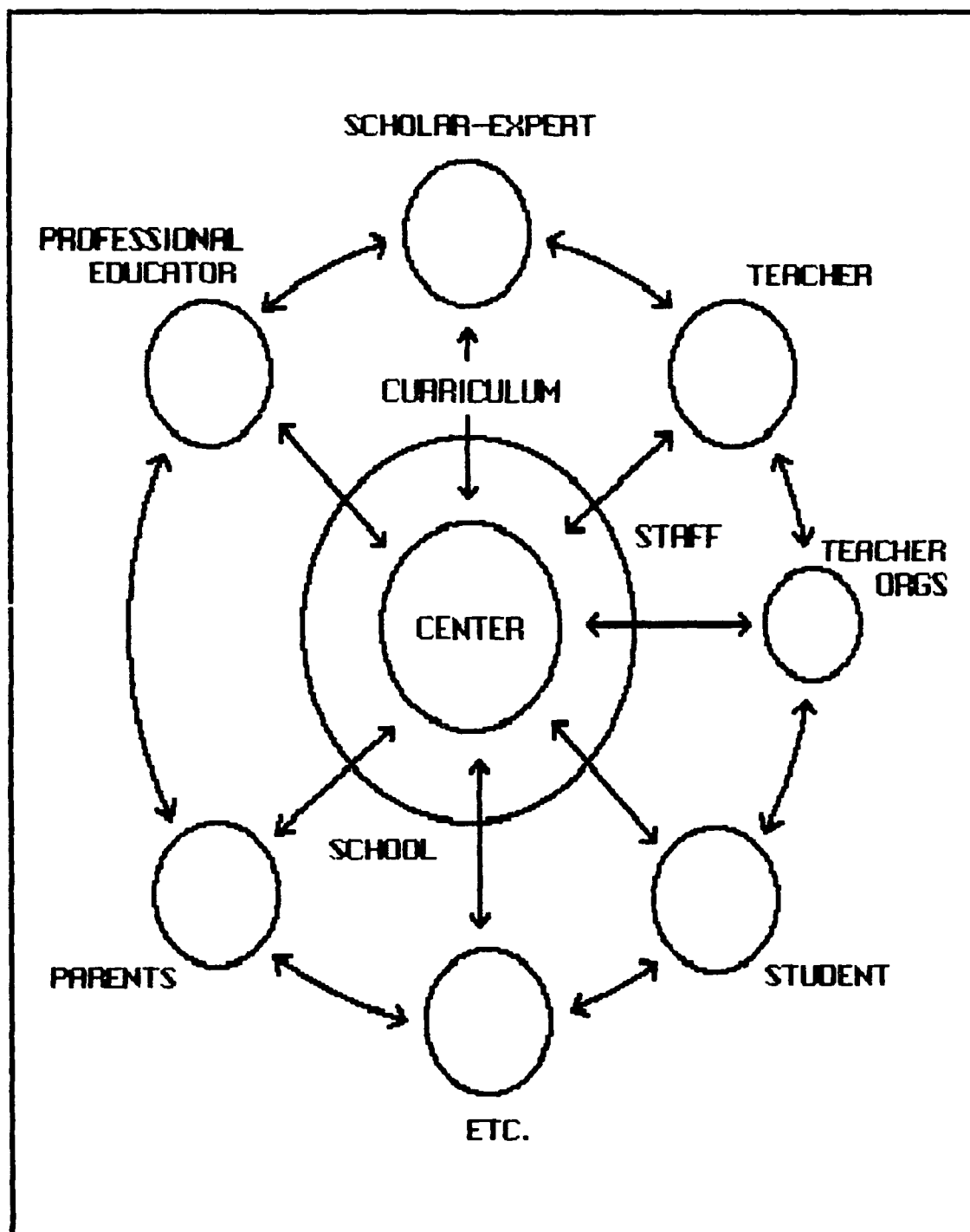


Figure 1. Continuous Interaction Model for Curriculum Activity

(27:214)

Parents, and other groups which combine to form the "Etc." category. The "Etc." category of the model includes the local, state and federal government; special interest groups; testing organizations, [e.g. Graduate Record Examination (GRE)]; textbook/software publishers; and all other groups which have an impact on the curriculum but are not included in the other categories (27:212-220).

All groups in the model impact the curriculum and are in turn impacted upon by the curriculum. The groups impact the curriculum by imposing their values and perceptions upon the material presented in the curriculum. The curriculum impacts the groups by either requiring their approval and conformance or by inspiring a group to attempt to change the curriculum to conform to their expectations (27:212-213).

The groups in the model impact the curriculum development process at different levels. The Professional Educator and the Scholar-Expert are at the most basic level of the curriculum development process; it is through their efforts that a solid foundation for the curriculum is developed. The Professional Educator presented in the model is responsible for the development of curriculum on a broad scale; for example, this person may develop a curriculum for second graders which is intended to be distributed nationally. The Scholar-Expert specializes in the content of a certain aspect of the curriculum; for example, this person may determine the math skills which should be

developed in second graders. The Teacher, Teacher Organizations and Students are the groups which influence the curriculum at the next level, which can be thought of as the implementation level (27:212-213).

The Teacher has the primary responsibility of implementing the curriculum. The Teacher is also responsible for the content of the curriculum, in that the examples chosen to present to the students are a reflection of the Teacher's own views of curriculum design. Teacher Organizations provide a forum for the discussion of curriculum development issues and may serve to develop curricula on a local, regional or national level. The Student must be considered in the discussion of curriculum development, even though they seldom have direct input to the development process. However, some institutions organize student curriculum development committees in order to obtain feedback and suggestions from the students. The remaining groups impact the curriculum development process at a level which is more external than the levels of the previous groups (27:212-213).

Parents usually impact curriculum development through parent organizations which seek to modify curricula at the local level. The groups which form the "Etc." category may seek to impact the curriculum development process at the local, state or national levels. Due to the far reaching influence of the various groups in this

category, they will be discussed in more detail in the following chapters (27:214-216).

The development of curricula is often a political compromise, rather than the result of research and work in the area of curriculum development. John D. McNeil in his book, Curriculum: A Comprehensive Introduction, emphasizes the political nature of curriculum development (25:272):

Most curriculum decisions, however, reflect conflicts among persons and groups. Like most political solutions, the curriculum comes about by compromise, bargaining, and other forms of accommodation. It is clear that the making of curriculum policy does not follow a tidy rational procedure resting on evidence from research. (25:272)

The political influences upon curricula include not only the government, but foundations and special interest groups as well. Foundations, such as the Ford, Rockefeller, Carnegie, and Kettering, are very active in curriculum development. The foundations are a major source of funds and influence upon curricula decisions. The foundations make an active effort to modify curricula through experimental research programs. The results of these programs are curricula which reflect the values of the various foundations. Schools are inclined to accept the professionally developed curricula of these foundations because of the cost savings gained as opposed to in-house curriculum development (25:270-271).

Special interests groups include community or local action groups, as well as organizations such as the John

Birch Society, Chamber of Commerce, and the AFL-CIO. The former groups attempt to modify curricula at the local level, while the latter organizations may attempt to bring about national curricula modifications. Special interest groups normally try to modify only one aspect of a curriculum instead of lobbying to change an entire curriculum (25:271).

From the diversity of the groups which have an impact on curriculum development, it is obvious that many of the groups are comprised of individuals which are not curriculum or even education experts. As noted earlier, a curriculum is often the product of a political compromise. Therefore, the teachers or instructors who are the principle implementers of a particular curriculum, may be at odds with the stated curriculum of the institution. These factors may lead to a conflict between what is presented in the classroom and the stated curriculum. Like the situation confronting civilian institutions, the curriculum development process of AFIT is subject to the influences of several different groups which provides the potential for conflict concerning curriculum descisions.

Figure 2 presents the primary external influences on the AFIT curriculum development process: the Air University (AU), the Air Force community, accreditation agency requirements, and external technology and knowledge. AFIT is a subordinate element of the AU. The AU influences the

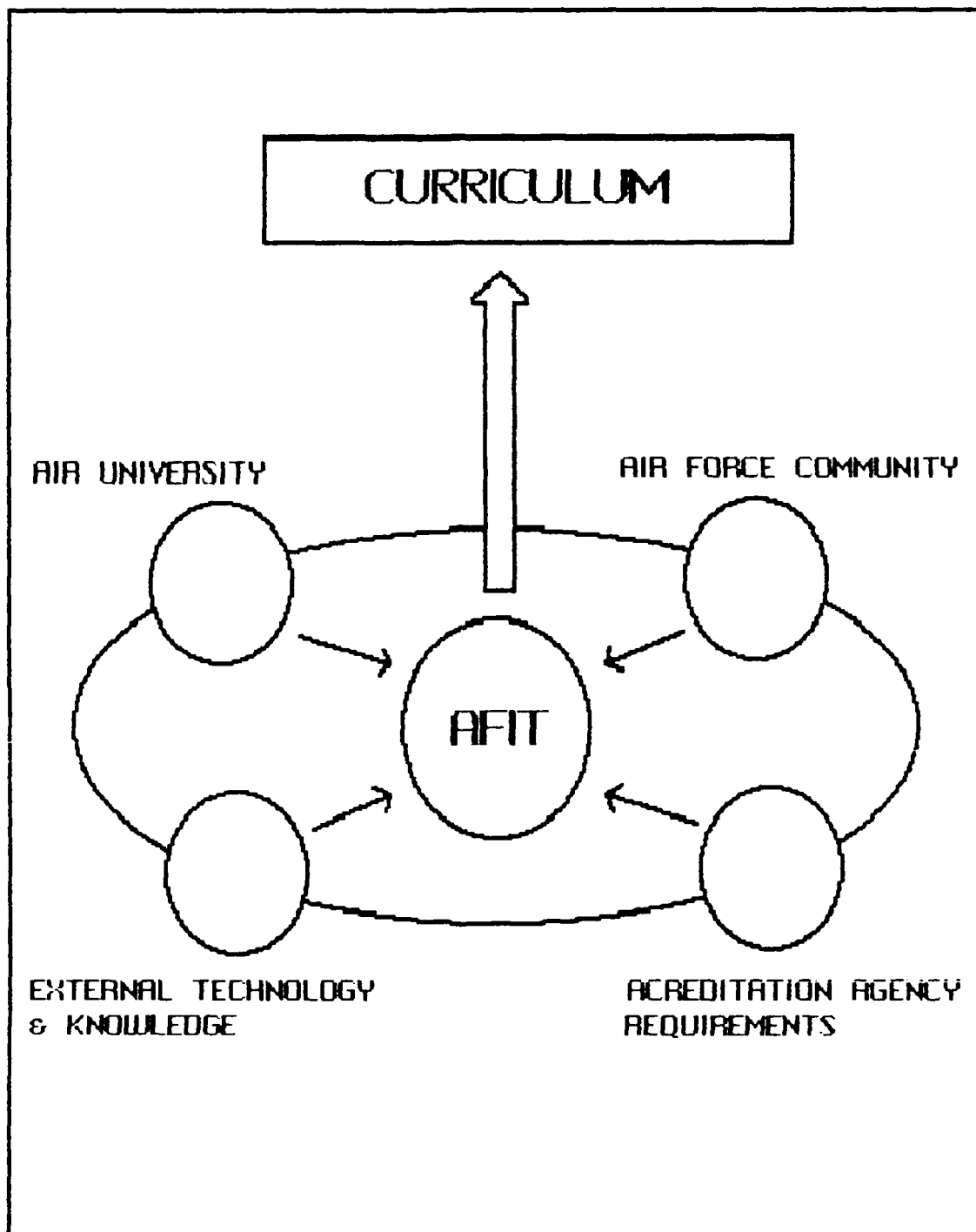


Figure 2. External Influences Upon the AFIT Curriculum

curriculum at AFIT through an annual review process by the AU Board of Visitors. The Board of Visitors is made up of distinguished educators which volunteer their time to serve on the board. AFIT has a subcommittee of the AU Board of Visitors. The subcommittee is comprised of nine members which are appointed by the AFIT Commandant. The members of the subcommittee are individuals from academia, the military, and industry. Annually the subcommittee reviews AFIT curricula and makes a report to the AU Board of Visitors (2:II.3-II.4).

The Air Force community represents the entire Air Force not included in AFIT or the AU. These are the MAJCOMs and functional managers which gain individuals upon their graduation from AFIT. The MAJCOMs impact the AFIT curriculum development process in two ways. First, the MAJCOMs identify their needs to the Transportation Training Advisory Group (TTAG) which maintains an interface with the AFIT Transportation Option Manager. Second, the MAJCOMs participate in a curriculum review conference every three years. The Air Force Community places certain expectations upon AFIT graduates and these expectations affect the curriculum developed at AFIT. The AFIT curriculum must instill the education needed by Air Force officers in order to meet the needs of the Air Force Community.

Accreditation requirements are the basic curriculum guidelines imposed on AFIT by the North Central Association

of Colleges and Schools. While AFIT received permission to grant degrees from Congress, complying with the guidelines of the accrediting agency displays AFIT's resolve to maintain the high standards of its peer educational institutions (2:I.2). These guidelines must be followed by AFIT to enable the institution's degree programs to be accepted as comparable to civilian graduate institutions.

External technology and knowledge is the ever growing body of management knowledge in the environment which is external to the Air Force. Examples in this category include advancements in transportation automation and national policy initiatives such as deregulation of the transportation industry. AFIT, as well as civilian institutions, must stay current with the external environment in order to avoid the "ivory tower" syndrome. The AFIT Faculty Handbook emphasizes the importance of external technology and knowledge to curriculum development by stating:

In the development of its [AFIT] resident curricula and courses and in the operation of its academic programs, the Institute emphasizes the necessity of keeping education current with rapidly expanding scientific, engineering, logistics, and management knowledge; ... (2:I.2)

The AFIT curriculum development process is influenced by several groups within AFIT itself. The Program Manager of the seven sequences of specialization in the graduate logistics management curriculum plays the primary role in AFIT curriculum development. In developing the curriculum,

the Program Manager receives input from the seven Option Managers and the Course Directors, as well as, feedback from students. The information is used by the Program Manager to develop a curriculum which satisfies the external groups noted earlier, with primary emphasis on serving the needs of the Air Force community. It should be noted that while the Program Manager has the overall responsibility for curriculum development, it is the Option Managers which provide the primary interface with the Air Force community and hence provides the information which is the basis for curriculum development. The Program Manager takes curriculum initiatives to the Graduate Curriculum and Degree Requirements Committee for development and approval. The curriculum is further developed and approved by the AFIT Faculty Council (12). Once the curriculum is developed, it is under a state of constant revision in order to keep abreast of external technology and knowledge (2:II.3,II.7).

AFIT and graduate level civilian institutions both have external influences which impact the development of their curricula. The difference in the amount of impact of the external influences on the curricula of these organizations is a matter of degree. The AFIT curriculum development process may be less susceptible to the effect of external influences. For example, special interest groups, which impact the curriculum of civilian institutions, are not likely to impact the AFIT curriculum. Both AFIT and

civilian institutions are effected by time constraints. The amount of time permitted for curriculum development impacts its quality. Also, the amount of time the student is enrolled in the institution's program has an effect upon curriculum development. The curriculum developer would surely prefer to add subjects or depth to the curriculum, but is forced to make compromises due to the length of the program at AFIT and civilian institutions. Hence, subject coverage is prioritized and only those subjects deemed most important are presented to the student.

Due to the variety of influences on curriculum development in both civilian institutions and AFIT, one would not expect any curriculum to conform to an ideal curriculum put forth by an expert in curriculum development. Consequently, it would seem highly probable that in the course of this research, differences will exist between the curricula of educational institutions and those put forth in articles published by professional journals. These articles are written by educators, who are free to create the ideal curriculum as they are uninhibited by the influences which shape curricula at AFIT and graduate level civilian institutions.

AFIT Transportation Program

The 1987 - 1989 AFIT course catalog was used to determine the current curriculum requirements for the

Transportation option of the Master of Science Graduate Logistics Management degree. The curriculum is listed below by course category:

Prerequisite Courses and/or Skills
None

Core Courses (39 quarter hours)
Applied Statistics for Managers I & II
Quantitative Decision-Making
Computer Programming Concepts
Computer Applications
Managerial Economics I
Financial Management
Research Methods
Management & Behavior in Organizations
Contract & Acquisition Management
Distribution Management
Maintenance & Production Management
Theory & Practice of Professional
Communication

Transportation Courses (9 quarter hours)
Transportation Systems & Strategic
Mobility
Transportation Management
Transportation Policy

Thesis Research (12 quarter hours)

Elective Courses (6 quarter hours) (1:173-174)

These courses are used by AFIT to accomplish its stated purpose, which is: "the primary purpose of the Transportation Management Major is to improve the student's skills in the planning, analysis and management of defense transportation systems" (1:172). AFIT accomplishes this goal by exposing the student to a combination of qualitative and quantitative techniques for problem recognition and resolution (1:172).

Civilian Graduate Transportation Programs

R. Neil Southern researched the undergraduate course offerings of 59 universities in his 1986 study. Southern used the catalogs of the universities to identify 296 Transportation/Distribution/Logistics (TDL) courses. The courses were divided into the the following categories: Transportation (171 courses), Distribution (36 courses), Logistics (42 courses), and Problems (47 courses) (30:312).

The universities identified a total of 171 courses in transportation. The courses were categorized as: General (total 35); Carrier (total 29); Traffic (total 26), Transportation Law, Regulatory, or Policy (total 31); Urban or Passenger (total 15); International Transportation (total 13); Transportation Economics (total 15); and Other Transportation courses (total 7). The Other Transportation category includes courses with titles such as Transportation Marketing and Sales Strategy, Transportation and Energy Interrelationships, Transportation Labor, History of Transportation and Its Control, Transportation of Dangerous and Hazardous Materials, and Computer Methods (30:312-313).

The study indicates there are 42 courses offered in the Logistics category. Southern did not attempt to categorize these courses; however, the course titles emphasize management and systems analysis.

The information presented in Southern's study reveals there are a great variety of ways in which

transportation and logistics courses are titled. This could have an impact on this thesis due to several different names being applied to roughly the same body of course material. Consequently, the process of comparing course titles between institutions may not yield entirely accurate results.

According to a study by Paul Zinszer, conducted for the Council of Logistics Management, there are 33 civilian institutions offering a transportation/logistics major at the graduate level (37:3). A study in 1987 by H. David Bess and Frederick M. Collison reported the total annual enrollment in graduate transportation courses to be over 3,300 students. The researchers mailed a questionnaire to all 236 of the schools accredited by the American Assembly of Collegiate Schools of Business (AACSB). A total of 157 questionnaires were returned for a response rate of 67 percent. The purpose of the questionnaire was to determine the general characteristics of the transportation/logistics courses offered by the schools who responded. Additionally, the researchers wanted to determine how the AACSB requirement for an international component to the curriculum was being met. Table 1 gives the course titles and characteristics of the civilian transportation courses at the graduate level. Bess found that 44% of the civilian institutions offer more than two courses in the transportation area and approximately 25% offer four or more transportation courses. Furthermore, 60% of the schools

Table 1
Characteristics of Graduate Courses
Offered by Civilian Institutions

<u>Course Title:</u>	<u>No:</u>	<u>%Tot:</u>	<u>Enrollment:</u>	<u>%Tot:</u>
Introductory Log.	33	20	814	24
Advanced Log.	23	14	478	14
Materials Mgmt	5	3	425	13
Principles of				
Transportation	12	7	384	11
Trans. Policy	16	10	168	5
Trans. Economics	10	6	118	3
Independent Study	12	7	105	3
Trans. Planning	5	3	93	3
Carrier Mgmt.	6	4	88	3
Urban Trans.	5	3	63	2
International Log.	3	2	53	2
Air Trans.	3	2	30	.9
International				
Trans.	4	2	25	.7
Trans. Management	3	2	18	.5
Water Trans.	2	1	10	.3
Rail Trans.	1	.6	10	.3
Traffic Mgmt.	1	.6	-	-
Highway Trans.	-	-	-	-
Trans. Labor	-	-	-	-
Trans. Law	1	.6	-	-
Other	24	15	504	15
Total	165	100%	3,386	100%

* "No." indicates the number of civilian institutions offering a course with the respective title.

** "%Tot" (Added by this researcher) shows the percent of the total number of colleges which offer a particular course and the percent of the total number of students which attend the course, respectively.

*** "Enrollment" indicates the total annual enrollment for each course.

(6:51)

reported an international component to their curriculum (6:50-51).

The information presented in Table 1 reveals only four courses which have an annual student enrollment of 10% or greater of the total enrolled in transportation/logistics courses. The four courses with the highest enrollment are: Introductory Logistics, Advanced Logistics, Materials Management and Principles of Transportation. Introductory Logistics and Principles of Transportation may be required courses which would account for their popularity. The course in Advanced Logistics would seem to be a reasonable elective for a student with a major in the transportation/logistics field. The only course which could give an indication of the emphasis of the civilian institutions is the Materials Management course. The Materials Management course accounts for 13% of the total annual enrollment and probably is not a required course in a transportation/logistics curriculum (6:51). The emphasis in materials management may compliment the findings of the earlier Zinszer study which indicated universities are broadening their program coverage to include a production orientation (37:5).

The results of the Bess study gives a weak indication of the current emphasis in transportation/logistics curricula of civilian institutions. While the popularity of the Materials Management course may supply some indication

of emphasis, the enrollment percentages of the more basic transportation courses do not indicate the direction of the curricula. Air, Water, Highway, and Rail are examples of the basic types of transportation courses; yet their enrollment percentages do not reflect any preference between modes or even a preference for taking such courses. These basic courses account for only 1.5% of the annual student enrollment. From the information presented in Bess' study, it may be difficult to determine the specific transportation/logistics orientation of the curricula of civilian institutions which will be compared to the AFIT curriculum in this research effort.

Industry Needs and Trends in Transportation/Logistics

In his 1981 article published in Logistics Spectrum, Benjamin S. Blanchard gives an example of the type of courses needed in a Masters degree curriculum in order for an individual to pass the Society of Logistics Engineers (SOLE) certification program. The SOLE certification program is a series of four exams which an individual must pass in order to become a Certified Professional Logistician (CPL). Blanchard identified six areas in which knowledge is desired: principles of management; the systems design process; basic statistics and mathematical concepts; operations research methods and techniques; economics and economic analyses methods; and computer methods and

applications (7:11). In order to obtain skills in these areas, Blanchard recommends the following Masters curriculum:

1. Suggested Required Core Courses
 - a. Advanced Statistics
 - b. Introduction to Operations Research
 - c. Advanced Methods of Operations Research
 - d. Systems Simulation and Modeling
 - e. Advanced Economic Analysis
 - f. Logistics Support Analysis
 - g. Logistics Technology and Management
2. Concentration in Logistics Management
 - a. Managerial Accounting
 - b. Organization Dynamics
 - c. Finance
 - d. Purchasing and Material Management
 - e. Contract Administration
 - f. Production Operations
 - g. Marketing
 - h. Business Logistics
 - i. Project and Report (7:12)

The curriculum presented by Blanchard is not the result of a specific study, rather it is his recommendations. Blanchard is a Professor and Assistant Dean at the Virginia Polytechnic Institute and has served as the Director at Large of SOLE. Additionally, he has 19 years of experience in industry and the Air Force, as well as 10 years of experience in academic community (7:13). While most would rate him an expert in the logistics field, it should be noted the curriculum information presented is his interpretation of the requirements of the SOLE certification program. However, his suggested curriculum provides useful information to the researcher in the transportation/logistics area.

In 1982, Richard A. Lancioni and William Dempsey wrote an article entitled, "The Need for an Integrated Logistics Discipline" published in Logistics Spectrum. The article discusses the need for a unified logistics curriculum (17:5). The authors highlight the different terminology used to describe what logistics is:

... in the commercial sector the function is referred to as distribution or physical distribution. In other industries it is sometimes called transportation management or materials management. In addition, some refer to the job of the logistician as traffic management. (17:5)

According to the authors, the different approaches to defining logistics emanates from the different bodies of knowledge used as the foundation in the curricula of various universities. The article suggests the following different approaches to logistics curricula: marketing, management science, operations management, and engineering. The different orientations to logistics curricula lead to different core course requirements from institution to institution. The authors show examples of the different logistics curricula by listing the MBA and MS curricula of Temple University, Weber State College, the Air Force Institute of Technology, and Texas A&M (17:7).

The article concludes there is no agreement on what course material should be included in the core courses of a logistics curriculum. The authors feel that the logistics curriculum of educational institutions must be integrated in

order for the logistics field to become more widely accepted by industry and the government.

While Lancioni and Dempsey make a strong case for logistics curriculum integration, it would have been helpful to the reader if the authors had commented on the curricula they presented in the article. In the context of this thesis, the implications of this article would suggest that it should be expected that curricula will vary widely from institution to institution depending on the particular orientation of the school.

C.K. Walter and Norman H. Erb conducted a survey in 1983 of recent graduates of the Western Illinois University majoring in Transportation and Physical Distribution (TPD) to evaluate the usefulness of courses presented in the university's TPD curriculum. The researchers also sent questionnaires to practitioners in industry and achieved a response rate of 45% for both graduate and practitioner surveys. The practitioners were selected on the basis of the following criteria: membership in logistics professional societies; or members of the University's TPD advisory committee; or employers of the graduate respondents (35:29).

The results of the survey indicate six courses which both graduates and practitioners found extremely important. The courses perceived as extremely important are: Traffic Management; Physical Distribution I & II; Pricing of Distribution; Financial Management; and Transportation Law I

(35:30). The authors drew the following conclusion from the study:

... a college program in transportation and physical distribution should be a blend of techniques to provide some job entry skills plus a conceptional orientation to provide upward job mobility. (35:33)

The study provides useful information; however, it should be noted that the graduate population consisted of only 29 individuals and with a response rate of 45%, the respondent population equals a total of 13 graduates (35:29-30). Due to this limitation, care should be taken in extrapolating the results of the study to the population. The study does provide practical information as to the courses which are the most useful to transportation and physical distribution practitioners.

Evelyn Thomchick, in her 1984 article entitled, "College-Level Transportation and Logistics Curricula" published in the Defense Transportation Journal, outlines the undergraduate business logistics curriculum at Pennsylvania State University. The article also includes her recommendations for a curriculum which would give a basic foundation in logistics. The curriculum would include the following courses as core courses:

a logistics survey course ...; a transportation systems course ...; an inventory/storage/materials handling course; a methods focusing on quantitative techniques used in transportation and logistics; and one or more specialized transportation and logistics courses. (33:61)

Thomchick is an assistant professor of business logistics at Pennsylvania State University. The curriculum recommendations, like those of the Blanchard article mentioned earlier, are based upon the author's expertise in the logistics area, rather than a specific study conducted for the purpose of transportation/logistics curricula development. The author's selection of the core courses reinforces the importance of a wide range of transportation/logistics skills which have been supported by other authors throughout this literature review.

The author cites the 1978 survey conducted by Canady and Stanhagen, who reviewed the course catalogs of 1,200 U.S. colleges. The survey reported that 22 universities offered graduate logistics programs (33:61). It would seem that the transportation/logistics career field is in the process of a rapid expansion. Compare this data with the 33 found in the 1985 Zinszer study; the number of universities offering graduate logistics programs has risen by one-third in seven years (13:3).

The National Council of Physical Distribution Management (NCPDM) has sponsored five studies between 1978 and 1985 to determine the educational needs of distribution managers. The results of the latter study (1985) are presented in an article by Joseph G. Mattingly, Jr., entitled, "Logistics Education", which was published in the Defense Transportation Journal. The following list of

educational needs represents the first choice and the percentages of distribution managers which perceived these educational needs as most important: computers, information processing, modeling with microcomputers, (31.3%); finance, accounting, (22.4%); logistics, transportation, (14.9%); general management, strategic planning, (9.7%); personnel, organizational behavior, humanities, (8.2%); marketing, (3.0%); other, (10.5%) (22:22).

The author lists three trends which impact the logistics function from the data gathered from the 210 survey respondents. The first trend is the rapid development of technology and information systems. The second trend is the move toward logistics integration. The responsibility of logistics functions in industry are expanding to cover the entire materials flow process. The third trend is the repositioning of the logistics function within the firm. The logistics function is becoming more important than ever before as evidenced by the growing number of vice presidents of logistics (22:20).

Mattingly did not conduct the survey himself, rather he presented a synopsis of a study completed by Bernard J. La Londe, et al. The study was originally published in the NCPDM Annual Meeting Report (22:20). For this reason, the methodology used to conduct the survey is unclear; for example, the author does not explain the criteria used to select respondents. However, considering the relatively

large number of distribution manager respondents (210), the information presented in the article provides an indication of the current educational needs and trends in the transportation/logistics field. From the information presented, it would appear that more firms are taking a total systems approach to the logistics function. The educational implications of this trend would result in a diversified or broad logistics curriculum, rather than a curriculum which specializes in one logistics function such as inventory management.

The 1985 Zinszer study, noted earlier, reveals future directions in the curricula of civilian universities. It would seem that the transportation/logistics career field is in the process of a rapid expansion. Compare the Canady and Stanhagen finding of 22 universities offering graduate logistics programs with the 33 found in the Zinszer study; the number of universities offering graduate logistics programs has risen by one-third in a seven year period.

The information presented in the Zinszer study was taken from mailed questionnaires and telephone interviews which contacted 360 universities known or believed to offer logistics courses. Schools not responding to the mailed questionnaire were contacted by telephone which gave the study a response rate of 100 percent. In an effort to determine the needs of industry in regards to logistics graduates, a total of 1690 questionnaires were mailed to

industry respondents with a response rate of 13 percent. The findings state that the current programs will expand to include, "greater use of computers" and "growth in program coverage to incorporate [a] production orientation" (37:5). Unfortunately, the study did not expand on these two trends in education. The study leaves the responsibility to the reader to determine what computer skills need emphasis and what new material will be presented in order for the curriculum to include a production orientation.

Industry rated verbal and written communication skills as the most important skill for a logistics graduate to possess. Other skills deemed important by industry were listed in descending order: general problem solving, analytical skills, general management skills, and logistics regulatory knowledge. The universities deemed general problem solving skills to be most important, with analytical skills a close second. Clearly, a gap exists between the perceptions of industry and educators as to the skills needed by a logistics graduate (37:13). In the context of this research, this gap could indicate articles written by individuals in industry will emphasize overall managerial skills. In contrast, articles written by educators may suggest the need for specific logistics skills.

The study conducted by Southern, mentioned previously, listed ten areas perceived by industry to be the most important courses for the future. The information was

obtained from a 1985 education survey conducted by the San Francisco Roundtable of the Council of Logistics Management (30:315). The courses deemed most important by industry for the future are:

- Financial Analysis
- Quantitative Analysis
- Project Management
- Inventory Control
- PD Cost Analysis
- Computer Training
- Industrial Traffic
- Accounting
- Transportation Economics
- Contract Negotiations (30:315)

According to Southern, if the aforementioned courses are the most important courses, then the curriculums researched in the study were found to be lacking in these areas. Southern concludes, "It may be that the material is being taught in existing TDL [Transportation/Distribution/Logistics] courses ... But even if this is the case, TDL course titles and course descriptions should be changed to reflect the fact" (30:315).

Southern seems to overlook the fact that at least half of the ten courses perceived important by industry are not TDL specific courses. The information may be presented to the student elsewhere in the curriculum. Most universities offer majors in transportation/logistics as a part of their Masters of Business Administration (MBA) degree; hence, courses in such areas as financial analysis and accounting are almost certainly required courses for the transportation/logistics student seeking an MBA degree. The

courses perceived important by industry are predominately in the area of overall managerial skills, instead of specific transportation/logistics courses as was suggested earlier.

In 1986, Paul R. Murphy, Jr. and Richard F. Poist analysed the ten trends in the current business environment put forth by John Naisbitt in his book, Megatrends. The authors were concerned with the educational implications for transportation and logistics professionals caused by the trends in business. Naisbitt's megatrends are:

Megatrend 1:

The change from an industrial to an information society.

Megatrend 2:

The change from forced technology to high-tech/high-touch.

Megatrend 3:

The shift from a national economy to a world economy.

Megatrend 4:

The shift from short-term to long-term perspective.

Megatrend 5:

The shift from centralization to decentralization.

Megatrend 6:

The shift from institutional help to self-help.

Megatrend 7:

The shift from a representative democracy to a participatory democracy.

Megatrend 8:

The shift from hierarchies to networking.

Megatrend 9:

The move from North to South.

Megatrend 10:

The shift from either/or to multiple options. (26:12-15)

The authors suggest the following broad categories of educational needs: technical knowledge; managerial knowledge; specialized knowledge; and general knowledge. In the category of technical knowledge the article suggests transportation/logistics managers should be familiar with computer hardware and software, to include telecommunications and robotics. The managerial knowledge needed by the transportation/logistics manager will need to encompass a broad range of managerial functions to include planning, organizing, leadership and control. Due to the trend of decentralization, the manager will be forced to make more decisions and will require more innovative approaches to management. Specialized knowledge will consist of keeping abreast of changes in the transportation/logistics field. The manager will also need education in fields such as marketing, finance, production/operations management. The general knowledge category suggested by the authors covers a wide range of educational topics to include geography, anthropology, foreign languages, speech communication, creative writing, history, economics, and ethics as examples (26:16).

The article calls for a broad approach to transportation/logistics curricula. The authors list so many areas in which the transportation/logistics manager needs education that it could not possibly be filled by a single Master's level transportation/logistics curriculum

due to time constraints of the program. However, the authors emphasize the need to be a generalists instead of a specialist in the transportation/logistics field. The information supports the finding of the earlier Zinszer study which suggested that firms are looking for transportation/logistics managers which are competent in overall managerial skills, with logistics knowledge as a close second in importance.

In 1987, a study was conducted by James F. Robeson for the Council of Logistics Management to determine the trends expected to occur in distribution from the period beginning 1987 into the period 1995. The study was conducted using the DELPHI technique. The respondents were composed of 176 individuals in industry and academia. The DELPHI technique uses a series of written surveys to question experts about a topic. The experts are presented with the comments of other experts and the process continues until a consensus of opinion is achieved (29:382).

The trends perceived as most important for the future are grouped in four categories and are listed in descending order of importance: computer/information processing related trends; international trends; domestic economic trends; and trends in management, strategies, and tactics. The computer/information processing related trends includes the rapidly growing use of data processing systems and electronic data interchange (EDI). International trends

will be the global distribution of products; hence, the need for a more sophisticated distribution system. In addition to distribution, sourcing will also be accomplished on an international basis. These factors combine to make individuals knowledgeable in international logistics critical to the future of U.S. companies. Domestic economic trends include the current trend toward merger, acquisition and consolidation which will lead to larger and fewer suppliers and producers. Trends in management, strategies, and tactics include increasing visibility of the logistics manager within the firm. Also, the trend will led to more companies offering a complete array of logistics and customer services (29:385).

The study outlines trends for the future of the transportation/logistics field. Many of the trends mentioned in the article have been emphasized by other authors mentioned in this literature review. The trends emphasize the need for transportation/logistics managers to have computer skills and to view logistics from the total systems approach.

Summary

It was noted in the first portion of the literature review that curricula are the products of compromise; hence, the curriculum in use by an institution may not meet the expectations of the curriculum expert or even its developer.

The curricula represent tradeoffs between external and internal influences.

All of the studies reviewed in the latter portion of the literature review suggest that a competent transportation/logistics professional needs a broad education in many different areas. The current trend is a move toward generalists, as opposed to specialists, in transportation/logistics curricula. The transportation/logistics professional needs not only traditional logistics education, but must also pursue education in areas such as computer systems and applications, information and data processing, financial analysis and accounting, as well as quantitative analysis techniques to name a few of the areas previously mentioned.

III. Methodology

Introduction

This chapter outlines the methodology used to answer the investigative questions and accomplish the objectives presented in Chapter One. The review of the literature (Chapter 2) provided the foundation for the selection of various methodologies used throughout the remainder of this research effort. The fundamental objective of this research effort was to compare the AFIT Graduate Transportation Management curriculum to similar curricula offered by graduate level civilian institutions. The purpose of this comparison is to provide the information necessary to develop an outline of the AFIT transportation curriculum for the 1990s. In accomplishing this task it should first be determined where the program is today with respect to other comparable programs.

Plan of Analysis

Four different methods of data collection and analysis were used in this thesis. These methods were: literature review, telephone interviews, personal interviews, and content analysis of the transportation curricula of civilian institutions and AFIT. Each method has particular advantages and limitations which will be discussed in the context of the investigative questions which use the data

collection and analysis method. In the paragraphs that follow, each investigative question listed in Chapter 1 will be restated and the method(s) used to answer the question will be explained.

Investigative Question 1. Which graduate level civilian curricula should the AFIT Graduate Transportation Management curriculum be compared to?

A review of transportation professional journals was conducted to determine which graduate level transportation schools' curricula would be compared to AFIT's transportation curriculum. The literature review is the method of choice because, "collection of primary data can be so costly and time-consuming as to be impractical" (11:135). The information gained from secondary data sources may not meet the specific needs of the researcher, which is the main disadvantage of secondary data collection (11:136). This limitation proved true in this research effort, because no list was found in the literature which ranked the graduate-level transportation schools using a criteria which considered the entire program at a given university. All the rankings of universities available in the literature ranked the schools according to very narrowly defined criteria, for example, the number of transportation/distribution/logistics courses offered in the school's curriculum.

To overcome this limitation, a list of civilian schools was compiled by combining the lists of several different authors, who used different criteria in creating their lists. In this way, as many aspects as possible of a civilian institution's curriculum are considered in the list. The following criteria was used to determine which civilian institutions' curricula were used in the comparison to the AFIT curriculum:

1. The institution must be located in the United States and must offer a graduate Masters level degree which provides for a major in transportation/logistics. In addition, the program should be large enough to have five or more students enrolled. The school must also comply with the criteria outlined in #2 and/or #3 below.

2. The school must demonstrate a desire to stay at the forefront of transportation/logistics education through research conducted by the faculty of the institution. The emphasis on research was determined by the amount of literature or articles published in transportation professional journals by the institution's faculty.

3. The school should evidence its commitment to the transportation/logistics area of education by offering a wide range of transportation/distribution/logistics courses as part of the curriculum.

The literature suggests there are 100 institutions in the United States which offer a major or a minor in

transportation/logistics at either the undergraduate or graduate level (37:7). The criteria stated above were used to reduce this list of schools to eight institutions which were used in the analysis.

Investigative Question 2. What subjects are currently emphasized in the transportation/logistics curricula of graduate level civilian institutions?

A curriculum content analysis was conducted on each of the civilian institution curricula. Content analysis provides the researcher with a systematic method of classifying written communication to determine major themes and similarities. The major limitation of the content analysis method is the reliance upon the judgement of the researcher to determine into which category a particular piece of information belongs (16:596-603). It should be noted that course categories are roughly equivalent, due to the broad interpretations and generalizations inherent to the content analysis technique. For example, a trend in civilian institutions' curricula is to require a course in finance and this course category is considered by content analysis to be roughly equivalent to the AFIT curriculum requirement of a financial management course. The actual course requirements of a course in this category at a particular civilian institution may differ greatly from the AFIT course requirement. The researcher strived to avoid

bias in categorizing an institution's curriculum by adapting the transportation course classification system used by R. Neil Southern, whose 1986 study was discussed in Chapter 2.

Research into curriculum offerings has shown this to be a very dynamic area. For example, Arizona State University offered 20 courses in logistics in 1985; one year later, the university offered only 10 logistics courses. Other schools have expanded their course offerings in the same period. Consequently, only 1988 - 1989 or most current graduate course catalogs were used to determine the transportation/logistics curriculum of each civilian institution. The following procedures were used in the process of the content analysis.

The first phase in the content analysis was to ascertain the curriculum of each of the eight civilian institutions. The effort to perform a content analysis on the civilian institutions' curricula was made more difficult due to the lack of course catalog standardization. The lack of standardization in course catalogs made it difficult to accurately determine the core course requirements for some institutions. The curricula (either MBA or MS) were divided into the following categories: Admission Criteria; Prerequisite Courses and/or Skills; Core Courses, and Transportation/Logistics courses which were either required or electives.

The second phase in the process was to determine the general theme or orientation of each institution's curriculum based upon the prerequisite and core courses. This determination was accomplished by identifying the number of courses required in each subject area of the Prerequisite and Core Course categories. All courses were examined and placed into the course category which best describes the general theme of the course. The course categories were divided into 12 Prerequisite Course and 22 Core Course categories. For example, Syracuse University has a calculus-based prerequisite course entitled Mathematics for Management which was placed in the Prerequisite Course section under the Calculus course category (31:5). This procedure was repeated until all of the prerequisite and core course requirements were accounted for, in regards to the curriculum of each institution.

The third phase of the content analysis was the categorization of the transportation/logistics courses according to the system adapted from Southern's study. All transportation/logistics courses offered by a particular civilian institution were categorized, except for the Massachusetts Institute of Technology which offers over 100 transportation/logistics courses (21:5). The categorization process was similar to the one used for prerequisite and core courses discussed in the second phase. The following categories were adapted from the Southern study: General

Transportation Courses; Carrier Management Courses; Traffic Management Courses; Transportation Law, Regulatory, or Policy Courses; Urban or Passenger Courses; International Transportation Courses; Transportation Economics Courses; Problems Courses; and Other Transportation Courses (30:313). The researcher attempted to use the categories presented above; however, after the data was analyzed the following course category changes were deemed necessary. Categories for Strategy & Planning Courses and General Logistics Courses were added. Additionally, the Traffic Management and Other Transportation course categories were deleted because none of the civilian institutions offered courses whose general theme belonged in these categories. The AFIT transportation curriculum was also identified and categorized using the process as outlined for the civilian institutions. The kinds of courses which were grouped into each category deserves further explanation and examples are presented here.

The General Transportation Course category consists of overview, introductory, and advanced courses in transportation. For example, the following course titles were grouped in this category: Transportation Principles or Fundamentals; Transportation Systems Analysis; and Advanced Transportation Management (30:313).

The Carrier Management Course category includes all courses which view Transportation by specific mode(s) and

courses dealing with freight forwarders. Example course titles are: Motor Carrier Management; Land Transportation Systems; and Transcontinental Motor and Freight Forwarder Transportation.

The Transportation Law, Regulatory, or Policy Courses category include courses with the words Law, Regulatory, or Policy in the titles. Example course titles are: Interstate Commerce Law and Practice, Transportation Regulatory Systems; and Transportation Policy (30:313).

The Urban or Passenger Courses category include courses with the words Urban, Rural, or Passenger in the titles. Example course titles are: Urban Transportation; Urban and Rural Transportation Management; and Management Issues in the Passenger Transportation Industry (30:313).

The International Transportation Courses category includes courses with the words International, Import, and Export in the titles. Example course titles are: International Transportation; and Export/Import Traffic Management and Procedures (30:313).

The Transportation Economics Courses category includes all courses concerned with Transportation Economics. Example course titles are: Economics of Transportation; and Freight Transportation Economics (30:313).

The Problems Courses category includes all problems, seminars, selected topics, and individual study courses. Example titles are: Seminar in Logistics/Transportation;

Selected Topics; and Directed Study in Transportation and Distribution (30:314).

The Strategy & Planning Course category consists of transportation/logistics courses in strategy and planning. For example, the following course titles were grouped in this category: Transportation Strategies (20:26); Logistics and Transport Planning (28:16-17); and Strategic Management of Transportation and Distribution Systems (31:25).

The General Logistics Course category consists of overview, introductory, and advanced courses in logistics. Example titles were: Logistics Systems (5:158); Logistics Systems Management (28:16); and Logistics of Physical Distribution Systems (31:25).

The fourth phase of the content analysis was to look for trends or areas of emphasis in each course category when the curricula of all the civilian institutions are combined. For example, if seven out of the eight total civilian institutions offer at least one course in statistics, then this would be noted as a trend or area of emphasis. The result of this phase was a consensus of what courses should be included in a graduate transportation curriculum from the perspective of the civilian institutions. The trend was considered significant if four or more of the eight civilian institutions included the trend or subject area in their respective curricula.

The fifth phase of the content analysis was comparing the information gained in phase four with the AFIT transportation curriculum. The purpose of the comparison is to identify similarities and differences in the curriculum requirements.

Investigative Question 3. To what extent does the AFIT transportation curriculum take into account the changes, (i.e., for example deregulation, computers, and the growth in international trade), that have occurred in the transportation industry during the 1980s?

In order to answer this question the researcher interviewed the current and previous AFIT transportation faculty. Since the transportation option of the Graduate Logistics Management program was founded in 1981, a total of six faculty members have or had responsibility for the transportation option. Telephone interviews were conducted with the four faculty members who are no longer assigned to AFIT. The two faculty members currently assigned to AFIT were surveyed using the personal interview method of data collection. The information gathered from these interviews was used to help answer the third investigative question and to secure background information about the program's orientation.

A telephone interview is one of the most cost and time efficient ways of gathering information from individuals

that are geographically separated from the interviewer. Telephone interviews are normally of limited time duration (10 minutes) and it is impossible to convey any type of graphical information to the respondent (10:40-47). The time limitation was not a hindrance to this research effort because the four respondents were interested in the research and hence submitted to telephone interviews which lasted on the average of 30 minutes. Additionally, the measurement questions used by the researcher required no graphical information to be presented to the respondent.

The measurement questions asked of each of the AFIT faculty members are presented below. The responses to the eighth measurement question, which deals with the skills needed by Air Force transportation officers for the 1990s, was used to help answer the fourth investigative question. The eight measurement questions were:

1. To what extent does the AFIT transportation curriculum take into account the changes, (i.e., for example deregulation, computers, and the growth in international trade), that have occurred in the transportation industry during the 1980s?

2. What were the major factors influencing the curriculum?

3. What direction did you try to emphasize in the AFIT transportation curriculum?

4. Does the AFIT transportation student have different educational requirements, as opposed to civilian graduate transportation students?

5. In your opinion, how does the AFIT transportation curriculum compare with civilian institutions' transportation/logistics curricula? (i.e., similarities, differences)

6. What type of orientation does (did) the AFIT transportation curriculum have? (e.g., policy, economics, engineering, managerial, multidisciplinary, or other)

7. Did you model the AFIT curriculum after a particular civilian institution's transportation curriculum?

8. In your opinion, what subjects need(ed) more emphasis in the AFIT curriculum to prepare the student for a career as an Air Force transportation officer in the 1990s?

Personal interviews were conducted with the two transportation faculty members currently assigned to AFIT. The faculty were asked the same questions, (listed above), as the previous faculty interviewed over the telephone. Personal interviews allow for greater detail of information to be gathered than most other forms of data collection, and permit the interviewer to seek additional information in response to the interview situation. The errors associated with personal interviews are nonresponse and response errors. A nonresponse error occurs when the researcher is unable to locate the intended respondent. Response errors

occur when the information reported is different from the actual data gathered. A response error may be caused by biases introduced by the interviewer or respondents who fail to answer questions fully and accurately (11:160-166). The threat of a nonresponse error was negligible in this survey as both faculty members agreed to be interviewed. Every effort was made in the course of this research effort to diminish the threat posed by response errors .

The information from the current and past faculty was compiled to determine what changes have occurred during the life of the program. The researcher identified trends in the information obtained. For example, if two or more of the faculty members suggested that external influences such as deregulation have had an impact on the transportation curriculum, then such trends in the data will be presented in Chapter 4.

Investigative Question 4. What skills will be needed by transportation/logistics professionals in the environment of the 1990s, according to civilian experts and AFIT transportation/logistics faculty?

A literature review was conducted to determine the direction civilian institutions will probably take with their programs for the 1990s. Respected publications such as the Transportation Research Forum and the annual conference reports of the Council of Logistics Management

provided indicators of the future trends in transportation curricula (9:382). The skills suggested by the various experts were combined to identify areas which most of the experts agreed would be important in the 1990s.

The skills most needed by transportation/logistics professionals, according to AFIT transportation/logistics faculty members, were ascertained from the interviews conducted for the first investigative question. The eighth question asked, "In your opinion, what subjects need(ed) more emphasis in the AFIT curriculum to prepare the student for a career as an Air Force transportation officer in the 1990s?" The answers were combined and any subject which received mention by two or more of the six faculty members was noted in Chapter 4.

The trends from the civilian experts will be combined with those of the AFIT faculty to identify similarities and differences. The trends thus identified were used to answer the fourth investigative question.

Summary

This research effort is based upon the four methods of analysis discussed in this chapter. The advantages and limitations of each of the methodologies, used to answer the investigative questions, were presented. The content analysis methodology provided the primary means of comparing

the AFIT transportation curriculum to the transportation curricula of civilian institutions.

The information obtained from the four investigative questions resulted in the findings presented in Chapter 4 and the AFIT curriculum recommendations outlined in Chapter 5. The recommendations were directed toward the current curriculum as outlined in the 1987 - 1989 AFIT course catalog and do not reflect any planned changes to the curriculum which have not taken effect as of yet.

IV. Findings

Introduction

The purpose of this chapter is to present the research findings which helped to answer the investigative questions introduced in Chapter One. The results of the review of transportation professional literature, the curriculum content analysis and interviews with AFIT transportation faculty members are provided in this chapter. The findings are discussed in the context of the four investigative questions.

Investigative Question 1

The first investigative question was concerned with determining which civilian institutions' transportation curricula would be compared with the AFIT transportation curriculum. A review of transportation professional journals was conducted to determine which graduate level transportation schools' curricula would be compared to AFIT's transportation curriculum. The institutions used in the comparison to the AFIT curriculum had to meet the criteria outlined in Chapter 3. The institution must offer a major in transportation/logistics at the Master's level with at least five or more students enrolled, according to the 1985 Zinszer study and be located in the United States (37:17-32). Additionally, the institution must evidence a

desire to stay at the forefront of transportation/logistics education through research conducted by the institution's faculty. This emphasis was demonstrated by the institution being ranked in the top 25 by the number of articles published in transportation and logistics journals for the period 1967 - 1985 in a 1987 study by Allen and Vellenga (2:46). If an institution did not meet the research requirement, then the institution must demonstrate its commitment to the transportation/logistics area of education by being ranked in the top 10 institutions by the number of transportation, distribution, and logistics courses offered (undergraduate & graduate) in a 1986 study by Southern (12:312).

Findings. The schools that comprise the list in Table 2 were selected because they met the criteria stated above, which evidences the institution's commitment to the transportation/logistics field. The term "Pub #X" indicates the rank that the institution occupies on Allen and Vellenga's 1987 list of schools. The term "Teach #X" indicates the rank that the institution occupies on Southern's 1986 list of schools. Additionally, all the universities listed in the table were reported to offer a major in transportation/logistics courses at the Graduate level with an enrollment of at least five students in a 1985 study by Zinszer, conducted for the Council of Logistics Management (37:17-32).

Table 2
Graduate Schools Ranked Highest in the Nation for Either
Articles Published or Number of Courses Offered

<u>School:</u>	<u>Ranking:</u>
Arizona State University	Pub #6 & Teach #10
Golden Gate University (CA)	Teach #1
Mass. Inst. of Tech.	Pub #1
Pennsylvania State University	Pub #2 & Teach #3
Syracuse University	Teach #7
University of Maryland	Pub #3
University of Tennessee	Pub #5 & Teach #2
Univ. of Wisconsin - Madison	Pub #8

* The schools are presented in alphabetical order.

** The term "Pub #X" indicates the rank that the institution occupies on Allen & Vellenga's 1987 list of schools ranked in the top twenty-five by number of articles published in transportation and logistics journals for the period 1967 - 85.

*** The term "Teach #X" indicates the rank that the institution occupies on Southern's 1986 list of schools ranked in the top ten in terms of the total number of transportation, distribution, and logistics courses offered for both undergraduate and graduate programs combined.

(3:46) (30:115) (37:17-32)

Investigative Question 2

The second investigative question was used to ascertain the current subjects which are being emphasized in the transportation curricula of graduate level civilian institutions. After the list of schools in the transportation field which meet the above stated criteria was determined, a curriculum content analysis was conducted on each of the civilian institution curricula. The content analysis was conducted in phases and the following information represents the findings for each of the five phases.

Phase I Findings. The first phase in the content analysis was to ascertain the curriculum of each of the eight civilian institutions. The curricula presented was taken from the most current graduate catalogs available from each of the institutions listed in Table 2. The following is the curricula for each of the named universities. The schools are discussed in alphabetical order.

Arizona State University. The university was ranked sixth in the nation for the number of articles published in transportation professional journals (3:46). Additionally, the university was ranked tenth in the nation for the number of graduate and undergraduate course offerings in transportation, distribution and logistics (30:115). The curriculum was taken from the ASU Bulletin Graduate Catalog 1989-90. Arizona State University offers a

MBA degree with a major (or concentration) in Transportation and Logistics. The degree requires the completion of 48 semester hours (5:44). The curriculum is listed below by course category:

Admission Criteria

- Undergraduate GPA of 3.00 (4.00 = A scale)
- Graduate Management Admission Test (GMAT)
- Statement of Personal Goals
- Letters of Recommendation (5:28)

Prerequisite Courses and/or Skills

- Calculus Course
- Demonstrated Computer Skills* (5:44)
- * The catalog does not further define this phrase.

Core Courses (36 semester hours)

- Financial Accounting
- Managerial Decision Analysis
- Managerial Economics
- Organization Theory and Behavior
- Marketing Management
- Managerial Finance
- Managerial Accounting
- Operations and Logistics Management
- Management Information and Decision Support Systems
- Managerial Communication
- Strategic Management
- Legal, Political and Ethical Issues for Business (5:44-45)

Transportation Electives (12 semester hours in which students may select four courses from the following offering)

- Urban Transportation
- Logistics Systems
- Carrier Management
- International Transportation
- National Transportation Policy
- Business Logistics
- Problems in Transportation (5:45,158)

Description of Curriculum

The Master of Business Administration degree is designed for those who seek a broad, integrated program with an opportunity for selected

specialization. It is designed to prepare students for leadership roles in business in the next century. (5:24)

Specifically, the curriculum includes instruction in:

Communication
Decision-Making
Problem-Identification and Resolution
Professional Behavior (5:44)

Arizona State University's curriculum is characterized by an emphasis on financial and accounting courses. The university requires the completion of one financial and two accounting courses. Additionally, the university requires one course in economics. The curriculum provides the student with a course in Management Information and Decision Support Systems. The university's transportation courses are characterized by a general management orientation.

Golden Gate University. The university was ranked first in the nation for the number of graduate and undergraduate course offerings in transportation, distribution and logistics (30:115). The university was not ranked in the top 25 schools for the number of articles published in transportation journals. The curriculum was taken from the Golden Gate University Bulletin 1988-1989. Golden Gate University offers a MS degree with a major (or concentration) in Transportation and Logistics Management. The degree requires the completion of 30 semester units of advanced level coursework with appropriate prerequisites (13:171). The curriculum is listed below by course category:

Admission Criteria

Undergraduate GPA of 2.50 (4.00 = A scale)
(13:28)

Prerequisite Courses and/or Skills

Decision Science for Managers
Organizational Behavior & Management Principles
Economics for Managers
Statistical Analysis for Managers
Transportation and Logistics
Math skills equivalent to College Algebra
(13:177-178)

Core Courses (21 semester units)

Principles of Transportation
Labor Management Relations
Principles of Purchasing Management
Integrated Logistics Management
Production and Operations Management
Forecasting Methods
Logistics Strategy (13:319-320)

Transportation Elective (3 semester units in which students may select one course from the following offering)

Legal and Regulatory Aspects of Transportation
Transportation Cost Analysis and Pricing
Selected Topics in Transportation & Logistics Management
Directed Study (13:319-320)

General Electives (6 semester units)

Description of Curriculum

The curriculum leading to the MS in Transportation and Logistics Management is intended to develop professionally-trained and knowledgeable managers in the related fields of transportation, distribution and logistics ... the program is designed to prepare those new to the field to handle the increasingly complex functions and decision-making processes entailed in these fields, and to further enhance the knowledge and skills of experienced transportation and logistics professionals seeking to complement practical experience with post-graduate education in their area. (13:171)

Golden Gate University's curriculum is college algebra based, unlike most of the other institutions which are

calculus-based. The university is the only school which requires two transportation courses as part of its core course requirements. Additionally, the university requires the completion of a forecasting course, which is not required by the other seven institutions. The curriculum displays a emphasis in pricing and purchasing management. The transportation courses offered display little of the schools orientation, because of the general nature of the courses. The possible exception to the school's general approach to transportation courses could be the inclusion of the Transportation Cost Analysis and Pricing course.

Massachusetts Institute of Technology. The university was ranked third in the nation for the number of articles published in transportation professional journals (3:46). The university did not appear on Southern's list of the top 10 schools by the number of TDL courses offered. Why the institution, which offers over 100 TDL courses, is not at the top of the list is unknown. The curriculum was taken from The Master of Science in Transportation Massachusetts Institute of Technology catalog. The Massachusetts Institute of Technology offers a MS degree with a major (or concentration) in Transportation. The degree requires the completion of eight graduate subjects and a thesis. The example curriculum presented below is for a Transportation Logistics concentration of the MS degree. The electives are examples taken from the over 100

transportation/logistics courses offered (21:5). The curriculum is listed below by course category:

Admission Criteria

Graduate Record Examination (GRE)
Statement of Personal Goals
Three Letters of Recommendation (21:11)

Prerequisite Courses and/or Skills

Two Calculus Courses
Economics
Probability
Familiarity with the use of computers in problem solving* (21:6,11)
* The catalog does not further define this phrase.

Core Courses (3 subjects)

Transportation Systems Analysis
Transportation Economics
Transportation and Logistics Analysis (21:6)

Program Area Courses (3 subjects)

Logistics and Transportation Planning Methods
Linear Programming
Network Optimization (21:6)

Electives (2 subjects may be selected by the student from the over 100 transportation/logistics electives offered)

Computer Algorithms in Transportation
Demand Modeling (21:6)

Description of Curriculum

The Master of Science in Transportation is designed for students with a broad range of undergraduate education and interests, and produces graduates with strong analytic and problem-solving skills (21:5). MIT offers concentrations in:

Air Transportation
Urban Transportation
Marine Transportation
Transportation Logistics
Transportation Infrastructure
Transportation Economics
Transportation Management
Transportation Analysis and Planning Methods (21:5)

The Massachusetts Institute of Technology curriculum is characterized by an emphasis on quantitative techniques for problem-solving. MIT is the only institution in this research effort which has the prerequisite requirement of two calculus courses. This emphasis on quantitative analysis is also evident in the transportation courses offered.

Pennsylvania State University. The university was ranked second in the nation for the number of articles published in transportation professional journals (3:46). Additionally, the university was ranked third in the nation for the number of graduate and undergraduate course offerings in transportation, distribution and logistics (30:115). The curriculum was taken from the Department of Business Logistics Information Guide. Pennsylvania State University offers both a MBA and a MS degree with a major (or concentration) in Business Logistics and Transportation. The curriculum for the MBA degree will be used in the comparison to the AFIT curriculum due to the large number of prerequisite courses (11 required) for the MS degree. A student attempting to enter the MS program would be required to take almost all of the MBA core course requirements as a prerequisite to the MS degree program. The MBA degree requires the completion of 54 semester credits (28:12-13). The curriculum is listed below by course category:

Admission Criteria & Prerequisites
Information Not Provided

Core Courses (39 semester credits)

- Financial and Managerial Accounting
- Behavioral Science in Business
- Statistical Analysis
- Quantitative Analysis
- Communication Skills for Management
- Financial Management
- Prices and Markets
- Operations Management
- Marketing Management
- Management Information Systems
- Business and Society
- International Business Management
- Administrative Integration (28:12)

Transportation/Logistics Electives (9 semester credits in which students may select three courses from the following offering)

- Logistics Systems Management
- Transport Policy
- Logistics and Transport Planning
- Logistics and Transport Management
- Seminar in Transport Economics and Policy
- Seminar in Business Logistics
- Individual Studies
- Special Topics (28:16-17)

Electives (6 semester credits)

Description of Curriculum

The basic purpose of the major field of study in Business Logistics ... graduate levels, is to prepare students for a wide range of professional opportunities in manufacturing, merchandising, and transportation companies, consulting firms, government agencies, and other organizations concerned with logistics and transportation activities. (28:2)

Pennsylvania State University's curriculum is the only school in this study which requires the completion of a course in international logistics as part of the core course requirements. The university is one of two schools which require a course in pricing and purchasing management, as well as a course in verbal and written communication. The

school's transportation courses emphasize policy and management issues.

Syracuse University. The university was ranked seventh in the nation for the number of graduate and undergraduate course offerings in transportation, distribution and logistics (30:115). However, the school did not appear in the top 25 institutions ranked by the number of articles published in transportation journals. The curriculum was taken from the Graduate Study: Syracuse University catalog. Syracuse University offers a MBA degree with a major (or concentration) in Transportation and Distribution Management. The degree requires the completion of 60 semester credits (31:4). The curriculum is listed below by course category:

Admission Criteria

Graduate Management Admission Test (GMAT)
Letters of Recommendation (31:47-48)

Prerequisite Courses and/or Skills

Mathematics for Management (31:5)

Core Courses (33 semester credits)

Basic Accounting
Organizational Behavior
Economics for Managers
Introduction to Managerial Statistics
Computer Laboratory
Fundamentals of Information Systems
Introduction to Management Information Systems
Concepts
Quantitative Aids to Administration
Managerial Finance
Marketing Management
Operations Management
Managerial Law and Public Policy
Business Policy (31:8,9)

Transportation and Distribution Management Electives
(12 semester credits in which students may select four
courses from the following offering)

Logistics of Physical Distribution Systems
Current Public Policy Issues in Transportation
Transportation and Distribution Systems
Operational Management of Transportation and
Distribution Systems
Strategic Management of Transportation and
Distribution Systems (31:25)

Electives (15 semester credits)

Description of Curriculum

Through a series of required core courses, students acquire a broad base of management understanding and knowledge. Then, in the program's remaining courses, students develop expertise by studying one or more areas of management in depth ... The 11 management core courses (one of which is offered through three one-credit components) provide an understanding of various analytical tools, an awareness of economic and behavioral concepts, and appreciation of social, political, and ethical influences on management decisions, a knowledge of the functional areas of management, and an awareness of policy formulation from the viewpoint of top management. (31:4)

Syracuse University's curriculum is the only institution in the study which requires a course in computer skills as part of its core course requirements. Additionally, the university is the only school which requires the completion of two courses in management information and decision support systems. The university's transportation courses emphasize operations management and strategic management.

University of Maryland. The university was ranked third in the nation for the number of articles published in transportation professional journals (3:46).

The university was not listed in the top 10 schools ranked by the number of TDL courses offered. The curriculum was taken from the University of Maryland College of Business and Management catalog. The University of Maryland offers a MBA degree with a major (or concentration) in Transportation. The degree requires the completion of 54 semester credits (20:3). The curriculum is listed below by course category:

Admission Criteria

- Undergraduate GPA of 3.00 (4.00 = A scale)
- Graduate Management Admission Test (GMAT)
- Written Statement of Objectives
- Three Letters of Recommendation (20:1A)

Prerequisite Courses

- Calculus
- Working Knowledge of Microcomputers* (20:4)
- *The catalog does not further define this phrase.

Core Courses (39 semester credits)

- Financial Accounting
- Managerial Accounting
- Management Information Systems
- Managerial Statistics
- Marketing Management
- Economic Environment
- Operations Research/Operations Management
- Financial Management
- Management and Organizational Behavior
- Managerial Economics
- Human Resources Management
- OR
- Physical Distribution Management
- Business and Public Policy
- Strategic Management (20:5)

Transportation Electives (9 semester credits in which students may select three courses from the following offering)

- Transportation Theory and Analysis
- Transport and Public Policy
- Transportation Strategies (20:26)

General Electives (6 semester credits)

Description of Curriculum

The University of Maryland MBA program has considerable breadth with courses in accounting, finance, statistics, marketing, economics, computers, strategic planning, and the legal environment of business. This breadth gives MBAs the skills to be masters of many trades, the skills to handle the total scope of complex jobs, not just the technical issues. (20:26)

The University of Maryland's curriculum is characterized by an emphasis on economics and accounting. The university requires the completion of two courses each in economics and accounting. Additionally, the school requires the completion of a finance course. The university's transportation courses emphasize policy and strategic management.

University of Tennessee. The university was ranked fifth in the nation for the number of articles published in transportation professional journals (3:46). Additionally, the university was ranked second in the nation for the number of graduate and undergraduate course offerings in transportation, distribution and logistics (30:115). The curriculum was taken from the Graduate Catalog/1988-89. The University of Tennessee offers a MBA degree with a major (or concentration) in Transportation and Logistics. The degree requires the completion of 60 semester hours (32:54). The curriculum is listed below by course category:

Admission Criteria

Undergraduate GPA of 2.5 (4.00 = A scale)
Graduate Management Admission Test (GMAT)
Letters of Recommendation (32:13)

Prerequisite Courses and/or Skills

Calculus
Basic Microcomputer Skills* (32:54)
*The catalog does not further define this phrase.

Core Courses (45 semester hours)

Business Administration (501,503,506,509)
Accounting (501,503)
Management
Statistics
Economics (501,503)
Management/Transportation
Management Science
Finance
Marketing
Business Law (32:54)

Transportation Electives (15 semester hours in which students may select three, but no more than four courses from the following offering)

Survey of Logistics and Transportation
Logistics and Transportation Economics and Policy
Freight Carrier Systems and Management
Operations and Logistics Management
Logistics Systems Management
International Logistics and Transportation
Executive-In-Residence Seminar in Logistics and Transportation Strategy
Independent Study
Special Topics in Logistics and Transportation (32:109)

Description of Curriculum

The MBA program is designed for students with undergraduate degrees in the social and natural sciences, the humanities, and professional fields such as engineering, business, agriculture, and architecture ... During the summer between the first and second year, students must complete an internship with a company using those skills acquired during the first year of the MBA program. (32:54)

The University of Tennessee curriculum emphasizes business management and economics. The university requires the completion of two courses each in economics and accounting. Additionally, the curriculum requires the completion of a course in finance. The transportation courses emphasize a total logistics approach to transportation issues.

University of Wisconsin - Madison. The university was ranked eighth in the nation for the number of articles published in transportation professional journals (3:46). The university is not listed in the top 10 schools ranked by the number of TDL courses offered. The curriculum was taken from the Bulletin School of Business - Graduate catalog. The University of Wisconsin - Madison offers both a MBA and a MS degree with a major (or concentration) in Transportation Policy. The curriculum for the MBA degree will be used in the comparison to the AFIT curriculum, because the graduate bulletin does not provide information on the core course requirements for the MS degree. The MBA degree requires the completion of a minimum of 30 semester hours, with the option of writing a thesis and completing the degree in 24 semester hours (36:3). The curriculum is listed below by course category:

Admission Criteria

Undergraduate GPA of 2.75 (4.00 = A scale)

Graduate Management Admission Test (GMAT)

OR

Graduate Record Exam (GRE) (36:1)

Prerequisite Courses and/or Skills

Intermediate Income Theory
Financial & Administrative Accounting
Managerial Accounting
Corporation Finance
Marketing
Organizational Behavior
Business Statistics
Legal Aspects of Business
Using Computers OR
Language Programming Algebraic
Mathematical Analysis for Business (36:4)

Core Courses (12 semester hours)

Business Policy
Advanced Statistics
Operations Management
Managerial Economics (36:3)

Transportation Electives (7-15 semester hours)

Economics of Transportation
The Economics of Regulation
Channels of Distribution
Transportation Policy
Reading and Research - Public Utilities and
Transportation
Seminar - Transportation and Public Utilities
(36:10-12)

General Electives (3 semester hours)

Description of Curriculum

The MBA programs stress the management/
operational aspects of these fields ... All programs
are oriented towards the significant issues arising
from extensive public regulation, investment and
planning. (36:3)

The University of Wisconsin - Madison's curriculum
requires more prerequisite courses than any other school in
the study. The emphasis of the curriculum is economics for
both the core and transportation courses.

Phase II Findings. The second phase in the process
was to determine the general theme or orientation of each
institution's curriculum based upon the required courses.

This determination was accomplished by identifying the number of courses required in each subject area of the Prerequisite Course and/or Skills category and the Core Course category.

The following abbreviations for the eight civilian universities will be used throughout the remainder of this thesis: Arizona State University, ASU; Golden Gate University, GGU; University of Maryland, UM; Massachusetts Institute of Technology, MIT; Pennsylvania State University, PSU; Syracuse University, SU; University of Tennessee, UT; University of Wisconsin - Madison, UWM. The findings, presented by university, can be found in Appendix: Course Categories.

Phase III Findings. The third phase of the content analysis was the categorization of the transportation/logistics courses. The civilian institution may have offered nine courses in transportation, of which the student was required to enroll in three or four depending on the institution. In the example presented above, all nine of the transportation would have been categorized. A description of each category is presented in Chapter Three.

The findings for the third phase are presented in Table 3. The table displays the information by institution for each of the transportation/logistics course categories mentioned earlier. The number in parentheses following the

Table 3
Transportation/Logistics Course Categories
by Institution

General Transportation Courses

GGU (1)
UM (1)
MIT (2)
PSU (1)
SU (2)
UT (3)
UWM (1)

Trans. Law, Reg., or
Policy Courses

ASU (1)
GGU (1)
UM (1)
PSU (1)
SU (1)
UWM (2)

Strategy & Planning Courses

GGU (1)
UM (1)
MIT (1)
PSU (1)
SU (1)

Problems Courses

ASU (1)
GGU (2)
PSU (4)
UT (3)
UWM (2)

General Logistics Courses

ASU (2)
GGU (1)
PSU (1)
SU (1)
UT (1)

Carrier Courses

ASU (1)
UT (1)

International Transportation
Courses

ASU (1)
UT (1)

Transportation
Economics Courses

MIT (1)
UT (1)

Urban or Passenger Courses

ASU (1)
UT (1)

name of an institution indicates the number of courses offered by the institution in the respective category.

Phase IV Findings. The fourth phase of the content analysis was to look for trends or areas of emphasis in each course category when the curricula of all the civilian institutions are combined. The result of this phase was a consensus of what courses should be included in a graduate transportation curriculum from the perspective of the civilian institutions.

The significant trends in transportation curricula are presented in Table 4. The trend was considered significant if four or more of the eight civilian institutions included the trend or subject area in their respective curricula. The trends are presented by major category. The number in parentheses following each trend indicates the number of institutions which include the subject area or trend. For example, the term "(5, + 1 school req. 2)" indicates five institutions require one course, plus one school requires two courses in the particular subject area.

Phase V Findings. The fifth phase of the content analysis was comparing the information gained in phase four with the AFIT transportation curriculum. The purpose of the comparison is to identify similarities and differences in the curriculum requirements. In order to illustrate the comparison, the AFIT transportation curriculum outlined in Chapter 2 is presented here.

Table 4
Significant Trends in Transportation Curricula
of Graduate Civilian Institutions

<u>Trend</u>	<u>Number of Schools</u>
<u>Admission Criteria:</u>	
Undergraduate GPA 2.5 - 3.00	(5)
GMAT or GRE	(6)
Letters of Recommendation	(5)
Statement of Personal Goals	(4)
<u>Prerequisite Courses and/or Skills:</u>	
Calculus Course (one course)	(5, + 1 school req. 2)
Computer Skills	(5)
<u>Core Course Categories:</u>	
Operations Management	(6)
Economics (one course)	(4, + 2 schools req 2)
Organizational Behavior	(5)
Statistical Analysis	(5)
Marketing	(5)
Business Policy	(5)
Finance	(5)
Financial Accounting	(5)
Managerial Accounting	(4)
Quantitative Analysis	(4)
Management Information & Decision Support Systems	(4)
<u>Transportation/Logistics Course Categories:</u>	
General Transportation	(7)
Transportation Law, Regulatory or Policy	(6)
Strategy & Planning	(5)
General Logistics	(5)

The Air Force Institute of Technology offers a MS degree with a major (or concentration) in Transportation Management. The degree requires the completion of 66 quarter hours and a thesis. The curriculum is listed below by course category:

Admission Criteria

Undergraduate GPA of 2.5 (4.00 = A scale)
Graduate Record Examination (GRE)
approx. score 1000
OR
Graduate Management Aptitude Test (GMAT)
approx. score 500 (1:10)

Prerequisite Courses and/or Skills
None

Core Courses (39 hours)

Applied Statistics for Managers I & II
Quantitative Decision-Making
Computer Programming Concepts
Computer Applications
Managerial Economics I
Financial Management
Research Methods
Management & Behavior in Organizations
Contract & Acquisition Management
Distribution Management
Maintenance & Production Management
Theory & Practice of Professional
Communication

Transportation Courses (9 quarter hours)

Transportation Systems & Strategic
Mobility
Transportation Management
Transportation Policy

Thesis Research (12 quarter hours)

Elective Courses (6 quarter hours) (1:173-174)

The subject area trends identified in Table 4 are compared to the AFIT transportation curriculum in Table 5. The term "Yes" indicates the course category is required by

Table 5
Comparison of Trends in the Transportation Curricula
of Civilian Institutions with the AFIT
Transportation Curriculum

<u>Course Category</u>	<u>Civ Inst Trend</u>	<u>AFIT</u>
<u>Admission Criteria:</u>		
Undergraduate GPA 2.5 - 3.0	Yes	Yes
GMAT or GRE	Yes	Yes
Letters of Recommendation	Yes	No
Statement of Personal Goals	Yes	No
<u>Prerequisite Courses and/or Skills:</u>		
Calculus Course	Yes	No
Computer Skills	Yes	No
<u>Core Course Categories:</u>		
Operations Management	Yes	Yes
Economics	Yes	Yes
Organizational Behavior	Yes	Yes
Statistical Analysis	Yes	Yes
Quantitative Analysis	Yes	Yes
Finance	Yes	Yes
Marketing	Yes	No
Business Policy	Yes	No
Financial Accounting	Yes	No
Managerial Accounting	Yes	No
Management Information & Decision Support Systems	Yes	No
Computer Skills	No	Yes
Research Methods	No	Yes
Contract & Acquisition Mgmt.	No	Yes
Distribution Management	No	Yes
Theory & Practice of Professional Communication	No	Yes
<u>Transportation/Logistics Course Categories:</u>		
General Transportation	Yes	Yes
Transportation Law, Regulatory or Policy	Yes	Yes
Strategy & Planning	Yes	No
General Logistics	Yes	Yes

the institution named in the respective column. The term "No" indicates the course category is not required by the institution named in the respective column.

The civilian institution curriculum trends are similar to the AFIT curriculum in many areas. The areas in which the trends of the civilian institutions differ from the AFIT transportation curriculum are discussed below. The Air Force Institute of Technology does not require Letters of Recommendation and a Statement of Personal Goals as part of its admission criteria. However, the Air Force does use Officer Effectiveness Reports (OERs) and the AF Form 90 which act in the same capacity as Letters of Recommendations and a Statement of Personal Goals. The majority of the civilian institutions require a Calculus course and computer skills as a prerequisite. The AFIT transportation curriculum is not Calculus based and the AFIT curriculum provides computer skills to the student through two required computer courses.

Most of the differences between the trends and the AFIT curriculum core course category result from the inherent differences between MBA and MS degrees as noted earlier. The difference in the two degrees accounts for the civilian institution trend of requiring courses in Marketing, Business Policy, Financial and Managerial Accounting. The civilian institution trend of requiring a course in Management Information & Decision Support Systems is

considered a significant finding by the researcher because of the importance of this subject area to the authors discussed in the literature review (Chapter 2).

Additionally, this area of study was deemed important by the AFIT transportation faculty members as noted earlier in this chapter and the importance of this area is congruent with the training strategies outlined in the Air Force Training Master Plan for the 1990s discussed in Chapter One.

The AFIT courses in Computer Skills; Research Methods; Contract & Acquisition Management; Distribution Management; and Theory & Practice of Professional Communication do not have a direct equivalent in the core course trends of the civilian institutions. However, the AFIT course in Distribution Management was included by the researcher in the General Logistics course category presented in Table 5. The AFIT emphasis on verbal and written communication skills is consistent with the importance placed on these skills by research in the transportation/logistics field as discussed in the literature review.

The trends of the civilian institutions and the AFIT transportation curriculum agree on the subject material for the Transportation/Logistics Course categories except in the Strategy & Planning Course category. While the AFIT curriculum does not provide for a specific course in the Strategy & Planning subject area, interviews with the AFIT transportation faculty members indicate the material is

presented in the context of the required transportation courses.

Investigative Question 3

The third investigative question was used to determine the extent to which the AFIT transportation curriculum takes into account changes in the commercial transportation environment. Examples of change in the commercial environment include deregulation and the use of computers. In order to answer this question the researcher interviewed the six AFIT faculty members which have or currently hold the position of Transportation Option Manager or Transportation Course Director for one or more of the transportation courses. The faculty members interviewed are: Tom Harrington, Option Manager 1981-83 (15); Jim Annesser, Option Manager 1983-86 (4); Rick Clarke, Course Director 1985-88 (8); Kent Gourdin, Option Manager 1986-88 (14); Robert Trempe, Option Manager 1988-Present (34); and Robert McCauley, Course Director 1988-Present (24).

The faculty members' responses to the interview are presented for each of the eight measurement questions. However, the responses for the eighth question is presented later in the chapter as part of the findings for investigative question #4.

Measurement Question 1. To what extent does the AFIT transportation curriculum take into account the changes,

(i.e., for example deregulation, computers, and the growth in international trade), that have occurred in the transportation industry during the 1980s?

Responses. All six of the transportation faculty members agreed the AFIT curriculum strives to provide good coverage of the effects of deregulation of the transportation industry and the considerations which lead to such national policy decisions. The faculty members, such as Jim Annesser, stated the AFIT transportation faculty use transportation professional journals to help keep the program abreast of current trends in the transportation environment (4). Three of the faculty members suggested that computer applications such as Electronic Data Interchange (EDI), which is the process of transferring information between two computer systems, does not receive the coverage the topic deserves (8; 14; 24). The subject of international logistics is defined differently by the commercial environment and the Air Force. Commercial companies view international logistics as the global sourcing and distribution of materials; while, the Air Force normally defines international logistics in the context of Foreign Military Sales (FMS) (34). While the curriculum only provides limited coverage of international logistics as defined by the commercial sector, students may take elective courses which deal exclusively with FMS.

Measurement Question 2. What were the major factors influencing the curriculum?

Responses. All of the faculty members agreed the major factor influencing the curriculum is the needs of the Air Force transportation community. According to Lieutenant Colonel Robert Trempe, the primary emphasis is upon building transportation leaders and providing them with a useful education (34). Additionally, the faculty members place strong emphasis on what each felt was important for the education of transportation officers based upon the faculty member's knowledge and experience in the field (14).

Two of the faculty members mentioned the requirements of the accreditation agency as being a positive influence on the program (15; 34). The accreditation requirements help to keep the program on the educational level, rather than the technical training level (15).

Measurement Question 3. What direction did you try to emphasize in the AFIT transportation curriculum?

Responses. All respondents reported attempting to integrate the use of civilian business techniques and technology in the AFIT transportation curriculum. It was felt by the faculty members that the Air Force tends to be slightly behind the business community in terms of logistics strategy and technology. An example of this situation is the Air Force's reluctance to enter into long-term contracts with carriers to secure rates and service levels, which is a

common strategy in the commercial transportation environment (24).

Measurement Question 4. Does the AFIT transportation student have different educational requirements, as opposed to civilian graduate transportation students?

Responses. All respondents answered this question by replying yes and no. The AFIT transportation student needs the same common body of transportation knowledge that a student in a civilian university receives; however, the AFIT student's emphasis is on Department of Defense (DOD) requirements as applied to the defense logistics environment (34).

Measurement Question 5. In your opinion, how does the AFIT transportation curriculum compare with civilian institutions' transportation/logistics curriculum? (i.e., similarities, differences)

Responses. The faculty members agreed that in terms of the quality of education, the AFIT degree compares very favorably with civilian institutions. However, most civilian schools offer Master of Business Administration (MBA) degrees as opposed to the Master of Science (MS) degree offered by AFIT. The MBA degree places more emphasis on traditional business skills such as accounting, finance and marketing. The MS degree provides AFIT with the freedom to include courses which help to give the transportation officer a better understanding of the military logistics

system (8). Three of the faculty members thought the AFIT transportation curriculum was very comparable to the transportation curriculum of the University of Tennessee at Knoxville (4; 24; 34).

Measurement Question 6. What type of orientation does (did) the AFIT transportation curriculum have? (e.g., policy, economics, engineering, managerial, multidisciplinary, or other)

Responses. The responses to this question are more varied than those of the previous questions. Three of the faculty members felt the orientation of the AFIT transportation curriculum could best be summarized as multidisciplinary (4; 24; 34). However, to one faculty member multidisciplinary described the managerial and technical emphasis of the curriculum (4). The other two faculty members felt multidisciplinary described the strategy, economic and cost analysis emphasis of the curriculum (24; 34).

Two faculty members believed the orientation of the curriculum to be policy (8; 14). The remaining faculty member considered the orientation of the curriculum to be defense applications (15).

Measurement Question 7. Did you model the AFIT curriculum after a particular civilian institution's transportation curriculum?

Responses. The faculty members responded the AFIT curriculum was not modeled after any other school's curriculum. However, Tom Harrington when designing the initial AFIT curriculum did research the curriculum offerings of Indiana University, the University of Tennessee, the University of Maryland and the University of Alabama (15). The remaining faculty members have built upon the curriculum established by Tom Harrington and as mentioned earlier, each faculty member influences the curriculum through their beliefs as to the educational requirements of Air Force transportation officers.

Investigative Question 4

The fourth investigative was used to determine what skills will be needed by transportation/logistics professionals in the environment of the 1990s. The recommendations for future skills were developed according to articles published civilian experts and interviews with AFIT transportation/logistics faculty members. A literature review was conducted to determine the direction civilian institutions will probably take with their programs for the 1990s. The skills suggested by the various experts were combined to identify areas in which most of the experts agreed would be important in the 1990s.

The skills most needed by transportation/logistics professionals, according to AFIT transportation/logistics

faculty members was ascertained from the interviews conducted for the third investigative question. The responses to the eighth measurement question were used to determine the skills needed by transportation/logistics professionals. A skill or subject which was mentioned by two or more of the AFIT transportation faculty members was considered to be important in the context of this research effort.

Findings. The findings from the literature review and the AFIT transportation faculty members are presented in Table 6. The first section displays the skills or educational requirements mentioned most frequently by the authors discussed in the review of transportation professional journals. The second section of Table 6 presents skills or educational requirements mentioned by two or more of the AFIT faculty.

The skills needed by Air Force transportation officer in 1990s, as suggested by the interviews conducted with the AFIT transportation faculty, generally agree with the skills needed by the civilian transportation/logistics professional for the 1990s. The only skill included in the AFIT transportation faculty list which was not included by the majority of the articles in the professional journals is Contract Negotiation skills. However, three of the authors discussed in the literature review suggest Contract

Table 6
Skills Deemed Most Important for Transportation
and Logistics Professionals in the 1990s

Skills Suggested By Professional Journals

Computer Systems & Applications
Management Information & Decision Support Systems
Financial Analysis & Accounting
Quantitative Analysis
General Problem Solving Skills
Verbal and Written Communication Skills

Skills Suggested By AFIT Transportation Faculty Members

Information & Decision Support Systems
Finance
Cost Accounting & Pricing
General Problem Solving Skills
Verbal and Written Communication Skills
Contract Negotiation Skills

Negotiation skills are important to the transportation/ logistics professional.

Summary

The findings from the four methodologies employed in this research effort have been discussed in this chapter. The findings of the content analysis provide validity to the assertion made by the literature review, which suggested there is no agreement on what subjects constitute a transportation/logistic curriculum. However, enough similarities exist to ascertain general trends in the curricula of civilian institutions.

The information presented in this chapter has helped to answer the four investigative questions which comprise this thesis effort. The findings discussed in this chapter have resulted in conclusions and recommendations concerning the AFIT transportation curriculum which will be discussed in Chapter 5.

V. Conclusions And Recommendations

Introduction

The primary objective of this research effort was to compare the AFIT Graduate Transportation Management curriculum to similar curricula offered by graduate level civilian institutions. The purpose of this comparison was to provide the information necessary to develop an outline of the transportation curriculum for the 1990s. The research effort centered around four investigative questions which were outlined in Chapter 1. This chapter presents the conclusions and recommendations for these questions. These conclusions and recommendations are based upon the information presented in Chapter 4.

Conclusions For Investigative Question 1

The first investigative question was concerned with determining which civilian institution's transportation curricula would be compared with the AFIT transportation curriculum. A review of transportation professional journals revealed eight civilian institutions which fulfilled the criteria established in Chapter 3. The institutions (presented in alphabetical order) are: Arizona State University; Golden Gate University; Massachusetts Institute of Technology; Pennsylvania State University;

Syracuse University; University of Maryland; University of Tennessee; and the University of Wisconsin - Madison.

The eight institutions were selected based upon the criteria established in Chapter 3. The criteria combined the rankings of several different authors and represents the best selection of peer institutions available from the information attainable in transportation professional journals. Briefly restated, the institution must offer a major in transportation/logistics at the Master's level, be located in the United States and have at least five students enrolled in the transportation/logistics program. The institution must display its commitment to research in the transportation field, as evidenced by the number of articles published in transportation professional journals. If the institution was not ranked in the top 25 schools by the number of articles published, then the institution must display its commitment to transportation/logistics programs, as evidenced by a ranking in the top 10 schools for the number of courses offered in this area.

The institutions which were used in the comparison provide a way to benchmark the AFIT transportation curriculum. However, all of the trends identified in the civilian transportation curricula should not be directly applied to the AFIT curriculum, due to the differences inherent to the programs. The foremost of the differences is the basic difference between MS and MBA degrees. The

majority of the civilian institutions offer MBA degrees as opposed to the MS degree. Consequently, some of the trends identified in the civilian curricula are due to the MBA degree program's emphasis on business courses and these trends should not be directly applied to the AFIT transportation curriculum.

Conclusions For Investigative Question 2

The second investigative attempted to determine the subjects which are currently emphasized in transportation curricula of graduate level civilian institutions. A content analysis was performed on the curriculum of each of the eight civilian institutions to identify trends or areas of emphasis. The findings from each curriculum were combined and all course categories which four or more of the institutions emphasized were considered trends or areas of emphasis. The trends were then compared to the AFIT Transportation curriculum.

The trends or subject areas of emphasis in the transportation curriculum of civilian institutions are:
Business Policy; Calculus; Computer Skills; Economics; Finance; Financial Accounting; General Transportation and Logistics courses; Management Information & Decision Support Systems; Managerial Accounting; Marketing; Organizational Behavior; Operations Management; Quantitative Analysis; Statistical Analysis; Transportation/Logistics Strategy &

Planning courses; and Transportation Law, Regulatory or Policy courses. After comparing these trends to the AFIT curriculum, the following course areas were not evident in the AFIT curriculum: Business Policy; Calculus; Financial Accounting; Management Information & Decision Support Systems; Managerial Accounting; Marketing; and a Transportation/Logistics Strategy & Planning course.

The most significant differences between the AFIT Transportation curriculum and the civilian institutions are: accounting courses; a management information and decision support systems course; and a course in transportation/logistics strategy & planning. Courses in these areas are emphasized by civilian institutions as well as the AFIT transportation faculty members.

Conclusions For Investigative Question 3

The third investigative question was used to determine the extent to which the AFIT transportation curriculum takes into account changes in the commercial transportation environment. Examples of change in the commercial environment include deregulation, the widespread use of computers and the growth in international trade. This question was answered by interviewing the six AFIT faculty members which have or currently hold the position of Transportation Option Manager or Transportation Course Director for one or more of the transportation courses.

The interviews revealed that the faculty responsible for the AFIT transportation curriculum take considerable effort to stay current with the commercial transportation environment and to incorporate this information into the curriculum. The faculty receive their doctoral degree from civilian institutions which provides the instructor with a strong background in the policy and economics of the commercial transportation environment. The faculty use transportation professional journals to stay current with the changes which occur in the transportation environment, especially the impact of deregulation on the transportation industry. The faculty emphasize the subjects which they feel are important to the education of Air Force transportation officers based upon their knowledge, career experience, and the interchange of information with the Air Force transportation community.

Three of the faculty felt a course in management information and decision support systems should be added to AFIT transportation curriculum. Management information systems are quickly becoming a standard of the commercial transportation industry and the systems have direct equivalents in military transportation for example, the On-Line Vehicle Integrated Management System (OL-VIMS), the Transportation Workload And Productivity System (T-WRAPS), Cargo Movement Operating System (CMOS) and the Carrier Evaluation and Reporting System (CERS). Courses in this

subject area are available at AFIT; however, the subject is not currently included in the transportation curriculum.

Conclusions For Investigative Question 4

The fourth investigative question was used to determine what skills will be needed by transportation/logistics professionals in the environment of the 1990s. A literature review was conducted to determine the direction civilian institutions will probably take with their programs for the 1990s. The skills suggested by the various experts were combined to identify areas in which the majority of the experts agreed would be important in the 1990s. The skills most needed by Air Force transportation officers were ascertained from interviews conducted with the six current and previous AFIT transportation faculty members.

Both the Air Force and the commercial sector are seeking more cost effective ways of operating, increased automation, and changing personnel requirements from specialist to generalists. For these reasons the skills required by the Air Force transportation officer and his civilian counterpart in the commercial sector are virtually the same. Both sources agreed the following subject areas were important to the education of transportation/logistics professionals: General Problem Solving Skills; Verbal and Written Communication Skills; Computer Skills and Applications; Management Information & Decision Support

Systems; Quantitative Analysis; and Financial Analysis & Accounting (to include Cost Accounting).

Recommendations

This research effort has led to two recommendations for the AFIT Transportation curriculum. These recommendations are discussed in the following paragraphs.

First, the Transportation curriculum should include a course in Management Information & Decision Support Systems. The AFIT curriculum differed from the civilian institutions' curricula by the inclusion of two courses in Computer Skills, (Computer Programming and Computer Simulation); one course each in Research Methods and Contract & Acquisition Management. AFIT also provides another Computer Skills course, (Introduction to AFIT Computer Systems), as part of the summer short term. If a course must be deleted in order to add a course in Management Information & Decision Support Systems, the researcher believes the logical deletion would be the last computer course which is Computer Simulation. Only one of the eight civilian institutions required a course similar to the AFIT Computer Simulation course. In the short term, transportation academic advisors should strongly urge transportation students to take the course as an elective. In the long term, the course should become a required core course of the AFIT transportation curriculum.

The second recommendation for the AFIT transportation curriculum would be to add another quarter to the length of the program for the inclusion of the other courses described in the conclusions of the fourth investigative question. Table 7 presents a model curriculum for the AFIT Transportation Management Option. The model curriculum was developed from the skills deemed necessary, by civilian experts and AFIT transportation faculty members, for transportation/logistics professional in the transportation environment of the 1990s. The includes the addition of an extra quarter.

General Problem Solving Skills could be enhanced through a course which applies statistical and quantitative analysis to transportation/logistics problems. Verbal and Written Communication Skills can be further developed with a case study oriented course which deals with real transportation/logistics problems taken from the faculty's experience in the field. The Financial Analysis & Accounting course should center around cost identification and analysis as applied to non-profit organizations. The researcher realizes adding another quarter to the AFIT program would be difficult; however, the Air Force would reap the benefits of better prepared officers for the complex transportation/logistics environment of the 1990s.

Table 7
Model Curriculum for the AFIT Transportation
Management Option

Suggested Courses

Finance

Federal Financial Management
Managerial or Cost Accounting For Non-Profit Organizations
Management Information & Decision Support Systems
Statistics (one course)
Quantitative Decision-Making
Quantitative Analysis Applied to Logistics Problems (further
develop general problem solving skills)
Computer Programming Concepts
Managerial Economics
Research Methods
Organizational Behavior
Distribution Management
Operations Management
Logistics Problems (case study course to develop verbal and
written communication skills)
Contract Negotiation & Acquisition Management
Transportation Systems & Strategic Mobility
Transportation Strategic Management
Transportation Policy
Two Electives

Recommendations For Further Research

The research presented in this thesis could be enhanced by a follow-on effort which emphasized ascertaining the needs of the Air Force community as related to the AFIT curriculum. The research could survey field-grade officers in the transportation career field to determine what skills are most needed by themselves and their subordinate officers. The information gained through this research would prove invaluable to future AFIT transportation curriculum decisions.

The AFIT transportation option would benefit from having a research effort similar to this one completed approximately every two to three years. In this manner, the AFIT transportation curriculum could be assured of staying current with the leading transportation programs offered by civilian institutions.

Appendix: Course Categories

Prerequisite Courses and/or Skills:

Accounting
UWM (req 2 courses)

Business Law
UWM

Calculus
ASU
UM
MIT (req 2 courses)
SU
UT
UWM

College Algebra
GGU

Computer Simulation
GGU

Computer Skills
ASU
UM
MIT
UT
UWM

Economics
GGU
MIT
UWM

Finance
UWM

Logistics
GGU

Marketing
UWM

Organizational Behavior
GGU
UWM

Statistics
GGU
UWM

Core Course Categories:

Business Law & Ethics
ASU
SU
UT

Business Mgmt
PSU
UT

Business Policy
UM
PSU
SU
UT
UWM

Computer Skills
SU

Economics

ASU
UM (req 2 courses)
MIT
SU
UT (req 2 courses)
UWM

Financial Accounting

ASU
UM
PSU
SU
UT

International Logistics

PSU

Marketing

ASU
UM
PSU
SU
UT

Managerial Accounting

ASU
UM
PSU
UT

Organizational Behavior

ASU
UM
PSU
SU
UT

Principles of Trans

GGU

Finance

ASU
UM
PSU
SU
UT

Forecasting

GGU

Labor Mgmt

GGU
UM

Management Info & DSS

ASU
UM
PSU
SU

Operations Management

ASU
GGU
UM
PSU
SU
UWM

Pricing & Purchasing Mgmt

GGU
PSU

Quantitative Analysis

ASU
MIT (req 2 courses)
PSU
SU

Statistics

UM
PSU
SU
UT
UWM

Trans/Log Mgmt

GGU
UM
UT

Strategy

ASU
GGU
UM

Verbal & Written Comm

ASU
PSU

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[REDACTED] [REDACTED]
[REDACTED]

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AFIT/GLM/LSM/89S-4		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION School of Systems and Logistics	6b. OFFICE SYMBOL (If applicable) AFIT/LSM	7a. NAME OF MONITORING ORGANIZATION	
6c. ADDRESS (City, State, and ZIP Code) Air Force Institute of Technology Wright-Patterson AFB OH 45433-6583		7b. ADDRESS (City, State, and ZIP Code)	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS	
		PROGRAM ELEMENT NO.	PROJECT NO.
		TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) A COMPARISON OF THE AIR FORCE INSTITUTE OF TECHNOLOGY GRADUATE TRANSPORTATION CURRICULUM TO SIMILAR CURRICULA OFFERED BY CIVILIAN INSTITUTIONS			
12. PERSONAL AUTHOR(S) Roger G. Brooks, B.S., Capt, USAF			
13a. TYPE OF REPORT MS Thesis	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1989 September	15. PAGE COUNT 120
16. SUPPLEMENTARY NOTATION			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
05	06		
		Education Universities Schools Training	
19. ABSTRACT (Continue on reverse if necessary and identify by block number) Thesis Advisor: Robert E. Trempe Instructor Department of Logistics Management Approved for public release: IAW AFR 190-1. <i>Larry W. Emmelhainz</i> LARRY W. EMMELHAINZ, Lt Col, USAF 14 Oct 89 Director of Research and Consultation Air Force Institute of Technology (AU) Wright-Patterson AFB OH 45433-6583			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL Robert E. Trempe, Instructor		22b. TELEPHONE (Include Area Code) (513) 255-4149	22c. OFFICE SYMBOL LSM

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The Directorate of Transportation, at HQ USAF, requested a thesis effort be put forth to research certain questions about the curriculum of the Transportation Management Option of the Graduate Logistics Management degree. These questions involve the appropriateness of the current curriculum in regard to the transportation environment of the 1990s and how the AFIT transportation curriculum compares with the transportation curriculum of graduate civilian institutions.

Interviews were conducted with the six individuals who have served as the Transportation Option Manager or Transportation Course Director since the program was founded. The purpose of the interviews was to determine what skills the Air Force transportation officer needs to operate in the environment of the 1990s. Results of the interviews suggest greater emphasis on: management information and decision support systems; financial analysis and cost accounting; verbal and written communication skills; general problem solving skills; and contract negotiation skills. (JES)

A content analysis was performed on the curriculum offerings of eight major civilian transportation schools and the findings were compared to the AFIT transportation curriculum. The study reveals most civilian institutions offer a MBA degree, while AFIT offers a MS degree in Transportation. Consequently, most differences in the AFIT and a civilian institution's curriculum stem from the business orientation of the civilian institutions. However, the following significant trends were noted in the curricula of civilian institutions: management information and decision support systems; financial analysis; and accounting.

The main goal of the thesis is to provide information which is useful in making future AFIT transportation curriculum decisions. In order to accomplish this goal, the research provides a model for the AFIT transportation curriculum of the 1990s, based upon the trends in civilian institutions and the interviews with the AFIT transportation faculty.

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