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A DETERMINATION OF THE PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OF AIR FORCE ADMINISTRATION OFFICERS

THESIS

Cheryl C. Coleman

Captain, USAF

AFIT/GIR/LSR/88D-1

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A DETERMINATION OF THE PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OF AIR FORCE ADMINISTRATION OFFICERS

THESIS

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

Cheryl C. Coleman, B.S., M.A.
Captain, USAF

December 1988

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Preface

The purpose of this research was to document statistically the computer background and experiences of Air Force administration officers. The objective was to identify where Air Force administration officers are now in terms of required computer skills, and what training needs they perceive as necessary. This study provides a 'snapshot' of the current computer knowledge levels and training needs of administration officers.

A questionnaire survey was used to collect the data from a sample of the population of Air Force administration officers. SPSSX software was used to determine frequency distributions and to test for differences between the ranks and educational levels of administration officers.

Throughout the writing of this thesis I have had a great deal of help and support from others. I am especially grateful to my thesis advisor, Capt Carl Davis, for his unwaivering enthusiasm and for the many hours of expert assistance and guidance he provided. I also wish to thank my GIR classmates for the advice and support they provided during the interview and pretesting phases of my research and survey questionnaire development. Finally, I want to thank my family for their patience and support throughout the research process and writing of this thesis.

Cheryl C. Coleman

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Abstract

The purpose of this study was to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency. Six investigative questions were posed: (1) Does the administration officer have job tasks that require computer skills? If so, how well can the officer perform the tasks? (2) What computer competency skills are required? How competent are current administration officers with each skill? (3) Have computer training courses been necessary to perform job related tasks? If so, what formal or informal training has the officer completed? (4) How has the automation of administrative functions changed the level of computer competency that administration officers need? (5) How does the level of computer literacy needed on the present job compare with the level needed in past jobs or assignments? (6) What computer applications and functions are most used or managed by administration officers?

This study found that administration officers have job tasks which require computer skills, but less than one-half of the officers perceive themselves as computer literate. Administration officers perceive they need both (1) general

computer and systems knowledge necessary for being an effective manager of automated systems, and (2) knowledge about microcomputers, associated hardware components, and standard software applications to improve individual job efficiency. Less than 25% have acquired computer skills through Air Force training. Administration officers believe that automation has raised the level of computer competency that they need and that the need for computer competency will be even more important in the future.

This study recommended three types of training to improve computer competency among Air Force administration officers: (1) Include computer orientation as part of the Administration Officer Course for all officers entering the administration career field, (2) Train directors of administration in management of automated systems, with specific information on existing automated administration programs, and (3) Make computer orientation courses available to all administration officers through MAJCOM sponsored programs with the focus on general computer knowledge and on applications and hardware specific to each MAJCOM.

A DETERMINATION OF THE PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OF AIR FORCE ADMINISTRATION OFFICERS

I. Introduction

General Issue

Within the past five years, many of the administrative functions in the Air Force have become automated. Administrative functions such as the base locator are moving from paper products to a computer screen. The automation of the records management function may soon make the storage of many paper documents obsolete. Management of the Publications Distribution Office (PDO) is being accomplished with a new software package and a microcomputer. In addition, many of the functions performed in the squadron orderly room are being automated by the PC-III program that is currently being tested for Air Force-wide implementation. Administration officers now have access to microcomputers with the opportunity of performing many job tasks more efficiently.

Under the reorganization of the Department of Defense in 1986, the Directorate of Administration was tasked with the management and policy to govern all Air Force information, electronic or written. Because of this tasking and the Air Force entry into the world of

microcomputers, the administration career field has recently recognized the need to educate its officers in computer concepts and information management. One result is the Graduate Information Resource Management (GIR) degree program which began in 1986 as an in-house program at the Air Force Institute of Technology. The GIR program emphasizes the management aspects of effectively designing, developing and implementing information systems. The intent of the program is to prepare students to use a full range of concepts, theories, and techniques in applying information technology to improve the management and performance of Air Force organizations (17). The curriculum for the Information Resource Management Program consists of 21 graduate courses, including 2 electives, plus 12 quarter hours of thesis research and study. Eleven of the courses provide a foundation for management skills. The foundational courses are:

1. MATH 525 Applied Statistics for Managers I
2. MATH 535 Applied Statistics for Managers II
3. OPER 526 Quantitative Decision Making
4. COMM 630 Research Methods
5. COMM 687 Theory and Practice of Professional Communications
6. AMGT 520 Managerial Economics
7. AMGT 600 Managerial Accounting
8. AMGT 602 Federal Financial Management
9. ORSC 542 Management and Behavior in Organizations
10. ORSC 626 Organizational Development
11. CMST 523 Contracting and Acquisition Management

Nine of the courses provide expertise in Information Resource Management. These courses are:

1. LOGM 490 Computer Programming Concepts for Managers
2. IMGT 560 Computer System Concepts
3. IMGT 561 Applications of Database Management Systems
4. IMGT 630 Conceptual Foundations for Information Systems
5. IMGT 645 Information Systems Project Management
6. IMGT 651 Systems Analysis and Design
7. IMGT 654 Information Systems Policy
8. IMGT 657 Information Systems Technology

Two elective courses complete the curriculum for the 79 quarter-hour program (17). This program, however, will train only a maximum of 10 officers every 12 months. This is a small percentage of the approximately 2,400 administration officers currently on active duty (20).

No Air Force studies have been done to determine just how computer literate administration officers should be to effectively perform in this rapidly changing computer environment. Since Air Force administration officers do not receive any formal computer training as part of the technical training process, the questions arise as to what computer skills Air Force administration officers need to effectively do their jobs and where these officers are now in terms of computer literacy.

Specific Problem

The specific problem for this research effort was to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of

training those administration officers perceive as necessary to improve computer competency.

Research Objective

The objective of this research was to document statistically the computer background and experiences of Air Force administration officers. The objective was to identify where Air Force administration officers are now in terms of computer literacy, and where they would like to be. This is a type of discrepancy analysis or needs assessment. According to Kaufman, a needs assessment-type study must have at least three characteristics. These are:

1. The data collected must represent the actual world of the current Air Force administration officer, both as it now exists and as it should exist in the future.

2. No needs assessment is a final product. Recognizing this, the present study is a first step, and computer literacy needs of these Air Force administration officers should be expected to change as they become more educated in computers.

3. The discrepancies that the present study identifies should be described in terms of products or behaviors that are required to close the gap between where we are and where we want to be rather than in terms of what means are required to close that gap (16:29).

Thus, as a result of determining what the needs of Air Force administration officers are, specific recommendations will be suggested to close the gap.

Investigative Questions:

The following questions must be answered to solve the research problem.

1. Does the administration officer have job tasks that require computer skills? If so, how well can the officer perform the tasks?
2. What computer competency skills are required? How competent are current administration officers with each skill?
3. Have computer training courses been necessary to perform job related tasks? If so, what formal or informal training has the officer completed?
4. How has the automation of administrative functions changed the level of computer competency that administration officers need?
5. How does the level of computer literacy needed on the present job compare with the level needed in past jobs or assignments?
6. What computer applications and functions are most used or managed by administration officers?

Definitions

Computer Literacy -- A level of knowledge adequate for the skillful, productive use of computer applications required

for a particular job, and a sufficient level of knowledge for the successful management of administrative systems and automated functions.

Air Force Administration Officer -- Officers with AFSCs 7024, 7016, 7034, and 7046. Company and field grade executive support officers are identified by AFSCs 7024 and 7016, respectively. Company and field grade functional administration managers are identified by AFSCs 7034 and 7046, respectively.

Needs Assessment -- The identification of two polar positions of what is the current situation, and how specifically the present position can be improved.

Information Systems -- User-machine systems for providing information to support operations, management, analysis and decision-making functions in an organization (4:6).

Scope

This research explored the required computer skills and training needs of Air Force administration officers. This group did not include civilians or enlisted personnel who are part of the administrative career field. Surveying current Air Force administration officers resulted in a 'snapshot' of current knowledge levels and needs. It is not intended to provide an accurate indication of the

knowledge level or needs of past or future Air Force administration officers.

Results of this analysis may not be applicable to all Air Force administration officers. Only CONUS administration officers were surveyed. Any job-unique or unusual computer literacy needs or requirements were not considered.

Organization of Thesis

This thesis is organized according to the model suggested in AFIT's Style Guide for Theses and Dissertations. Chapter I contains an introduction to the study including the general issue from which the specific research problem evolved, the investigative questions, the research objective, definitions of key terms, and the scope of the study.

Chapter II contains a review of literature relevant to this study. Topics discussed include recent events within the administration career field, a review of civilian computer literacy studies, and an assessment of computer training methods used by civilian managers.

Chapter III discusses the methodology used to solve the specific problem and details the design used for data analysis.

Chapter IV contains the analyses of the survey information and answers the investigative questions of this study.

Chapter V summarizes the study and makes recommendations based on the study's findings.

II. Background

No Air Force studies could be located which determined the computer literacy needs of administration officers or officers in other career fields. During the past year, however, the computer literacy of administrative officers has become a high-priority topic for the top decision makers in the administrative career field. This topic was on the agenda for the April 1988 Destiny Conference, a body composed of the Director of Information Management and Administration from the Pentagon and the MAJCOM Directors of Administration (DAs) (20). This group of DAs meets twice a year and is tasked with charting the direction for the career field. During the April conference, the DAs discussed the state of the career field in terms of computer literacy and preliminary training requirements to be reviewed by an Air Training Command (ATC) utilization and training workshop (UTW) scheduled to meet in the fall of 1988. The purpose of the UTW will be to determine if computer training requirements should be added to the technical training curriculum for administration officer courses, and if so, what requirements should be included.

This research effort addressed both of these areas; the study determined where administration officers are in terms of computer literacy and made recommendations for training requirements based on survey results.

One reason for this current interest in the computer literacy of administration officers is a Secretary of the Air Force order dated 19 Nov 1987 (23). This order realigned the Air Force administration function under the Administrative Assistant to the Secretary of the Air Force. It tasked the administrators with a new responsibility: the management and policy to govern information in any form (written or electronic) used to conduct the general business of the Air Force (23). This tasking to manage information, particularly that created and transferred on electronic media, will require that administration officers have adequate computer knowledge to carry out new job tasks.

Administrative officers, themselves, have voiced a need to be better educated in computer skills. Major Chavis W. Harris, an Education with Industry (EWI) officer, is currently assigned with Westinghouse Electric Corporation. Major Harris wrote in his first quarterly report to the Air Force Institute of Technology:

> I was immediately impressed with the amount of computer literacy the average white-collar worker must have in order to be proficient at his job. PC's can be found on virtually every desk. They are an integral part of the daily works habits of the majority of Westinghouse employees. The stark contrast that comes to mind is the very select and limited scope of computer usage for the average individual in the Air Force. We are experiencing a change which will find us in the same relative position that Westinghouse is in now approximately five or ten years into the future. We must be ready to manage this technological change [14:4].

The same needs were voiced by Captain Catherine L. Gonzales, an EWI officer also assigned with Westinghouse. In her quarterly report to AFIT, she wrote, 'Considering I had absolutely no knowledge of computers, I have managed to become 'computer literate' with my very own IBM PC. Everyone has one and in this environment, it's a must' (12:3).

Civilian Studies

Since administration officers are the 'general managers' of administrative functions, a review of civilian literature was helpful in determining how civilian organizations meet the computer training needs for their managers. Several studies were found which assessed the computer knowledge levels and training needs of general managers and public administrators.

Need for Computer Training

A study completed at Portland State University in 1983 surveyed students enrolled in a Master of Public Administration program to determine their opinions about the importance of knowledge in computer literacy, computer applications and management of computer resources (25:8). A test was administered to a group of 24 students both before and after taking a course titled 'Management Uses of the Computer in the Public Sector.' The test measured the students' opinions of the importance of the three areas on a 10 point scale but did not attempt to measure existing

knowledge levels. After the pretest, students attended the course which focused on three areas of knowledge: (1) Computer literacy, defined as knowledge of basic computer concepts and acronymns which was taught through reading and lecture; (2) Appreciation of the range of computer applications, taught through reading, lecture, and hands-on experience; and (3) Management of computer resources taught through reading and case studies (25:8).

After the students completed the course, the same test was administered and the results were compared with the pretest. In both tests, the students ranked the importance of the three areas of study in the same order. Management of computer resources was ranked highest, followed by computer literacy and computer applications knowledge. However, in the posttest, students showed an increase in the importance they placed on computer management and literacy and a decrease in the importance placed on knowledge about applications. The test results indicated that many students, after completing the course, shifted their level of importance toward management issues and familiarity with basic concepts rather than use of applications. From the test results, the author drew the following conclusions:

> These effects seem to indicate that a balanced exposure to computer concepts, applications, and management issues will deflate the mystique of the computer and all its latest applications as ends unto themselves, thereby facilitating the growth of a healthier management perspective. That perspective

> views computer resources as organizational resources, like other organizational resources, that effective administrators must know something about and must try to manage to accomplish organizational goals [25:9].

As part of the same study, the students at Portland State University participated in a project to interview 14 practicing managers. The purpose of the project was to determine what the managers felt they needed to know most about computers to do their jobs, and to compare the managers' opinions with those received from the students on the tests already described. 'The managers stressed the importance of general knowledge, understanding, and concepts more than specific computer skills' (25:10). However, interviews also revealed considerable concern for the need that middle and upper level managers start using computers themselves. Overall, the interviews indicated managers' recognition that effective organizational use of computer resources involves both management issues and applications issues. The data obtained from the managers showed that they, like the students after taking the course, placed more importance on knowledge of computer resource management and general computer concepts than on use of individual applications.

In several other articles located in the literature, managers came to the same conclusions as those of the students and managers in the Portland study. Robert Puette, a general manager of Hewlett-Packard, stated, 'Part of my job is to increase productivity of my people over the

long term. Today, I can't do that without knowing the capabilities of the microcomputer' (21:28). Puette concluded that managers do not necessarily have to use the microcomputer, but learning what a microcomputer can do is critically important to request the right information from someone using one (21:28).

Bruce Borner, President of Computer Projections, agreed with Puette that managers must know the capabilities of the microcomputer. With the computer becoming mandatory for an organization to remain competitive, the manager must be knowledgeable enough to be able to lead his staff into the computer world of the future (2:23).

Vice presidents and chief executive officers in large and small corporations were surveyed by mail to determine what hardware and software, if any, they were using. Of the 54 respondents, 52% were using a personal computer to perform job duties (1:35). Of the 48% who did not currently use a computer, 85% agreed that there was a place in their management environment for a microcomputer, and the senior executives said that they intended to purchase one. The group of users unanimously agreed that microcomputers increased their efficiency, and they would advocate the use of them to their colleagues (1:35). The survey respondents also predicted that it would be only a matter of time before technology would make it possible for them to use the microcomputer for strategic planning and

decision making. The article's author concluded that microcomputer use by managers is inevitable, and estimated by the 1990s, the microcomputer will be as common on the manager's desk as the telephone (1:35).

Although the managers in the previous studies agreed that they needed training, particularly in computer capabilities as opposed to specific applications, none of the studies determined if the level of the manager influenced the reported training needs. One study was located which compared reported training needs with the levels of the managers surveyed.

Managers were asked to consider items on a training-needs survey and indicate on a Likert-type scale to what extent they needed training in that area. The survey sample consisted of 344 lower level managers and 162 middle level managers (8:43). Results of the study showed a small but significant difference in reported training needs based on management level. Lower level managers reported higher needs in specific skills, while middle level managers reported higher needs in quality control and more general training (8:49).

Differences in reported training needs based on management level will be part of the survey analysis for this research effort. Training needs reported by the administration officers will be analyzed based on company grade and field grade classifications.

In addition to civilian corporations, U.S. Government agencies have begun to study the need for computer training. A research report was done in 1985 for the National Commission for Employment Policy to determine what training is required by people who work with computers or computer-based equipment (11:i). The study was conducted by interviewing employers and employees in various job categories, and the interview results were reported for each individually defined job category. Training needs identified with the category 'Managers and Administrators' included specific applications, such as spreadsheets, word processing programs and graphics, abilities to program and develop specialized programs for an organization, and management of information systems. Based on the interviews, the researcher determined training to be particularly important for middle managers who direct various departments and particular areas, such as personnel, accounting, finance, or marketing (11:72).

Assessing Training Methods

If the need for computer training for managers exists, how should the training be accomplished? Several articles were found which addressed this question. In one study, 70 managers in a major U.S. city were surveyed to determine what computer training they had received and how they perceived the quality of the training (15:15). The managers surveyed were not data processing managers but

were currently using the computer in a decision-making role. Managers indicated that 34% had received in-house computer training, while 41% had received training at an off-site location. Twenty-two percent had received no formal training and had taught themselves to use the system through trial-and-error. Almost half of the managers were trained in a workshop technique using both lecture and hands-on training; for 80% of the managers, this training was accomplished in one day. Over half (56%) rated the adequacy of their training as below average or not useful at all. One problem cited by 70% of the managers was that too much time elapsed between training and using the system on the job. Managers were also asked to compare the computer training to other types of training they had received. Again, over half (55%) rated the training worse than or much worse than training programs they had attended in other management areas (15:16).

Although this survey did not attempt to measure computer knowledge levels, it did shed doubts on the training procedures currently being employed to train managers. The author concluded that because managers are going to have to use computer in their job environment, adequate training is a necessity. "A company that expects its managers to use computer systems should evaluate the current method of training to see if it is effective" (15:17).

Other studies also looked specifically at the methods used to respond to the training needs of managers. In a 1985 study done by Purdue University, questionnaires were sent to 387 manufacturing companies (3:38). The questions were not aimed at determining specific areas where the supervisors needed to become computer literate, but at how the companies intended to provide training for them. The companies preferred in-house trainers over outside consultants or training programs. Self-study was their least preferred method of conducting training. Of the companies surveyed by Purdue, 61% expected managers' use of microcomputers to rise over the next three years and this rise to increase the need for computer training developed specifically for the managers.

According to Jim Hall-Sheehy, (13:25) the management training should be approached in stages, and training should progress through each stage until the appropriate level of knowledge for a particular job is reached. Hall-Sheehy identified the following six stages of learning instead of using one definition for the term computer-literacy:

(1) Computer Knowledgeable - Learning the vocabulary, reading basic books or instruction manuals, finding out the important issues in personal computing and the organizations' plans for using personal computers.

(2) Computer Practical - Understanding the various components and system configurations, being able to turn one on and use its operating system.

(3) Software Informed - Understand what various software packages are capable of doing, finding out how people in various departments or other organizations are using particular programs, and having a good understanding about issues such as backup, security, and documentation.

(4) Applications Capable - Knowing the ins and outs of one or more software packages and being able to make the software do what you want it to.

(5) Applications Resource - Being able to trouble-shoot particular software problems, able to help others identify which software packages meet their specific needs.

(6) Computer Conversant - Having the ability to program.

Individuals who mastered all six stages would be fairly well educated on the personal computer as it exists in business environments today. Hall-Sheehy agreed with the previous literature that most managers probably do not need to reach the sixth stage of learning in order to perform effectively. "Managers should understand what computers are capable of, what information is available through them and how to produce that information" (13:25). He concludes that trainers should forget trying to define computer literacy and apply the stages of learning to different staff levels and jobs.

Another survey examined the rise in interest for computer education and training of managers as a direct result of an increase in personal productivity of the managers (22:17). This 1984 survey sampled 2000 members of the Data Processing Management Association (DPMA). The 452 usable responses showed that six levels of training existed, ranging from no training at all to training provided by a specific department designated to meet personal computer needs. About one-third of the companies provided no training, one-third had designated a specific department to enhance microcomputer usage, and the remaining third fell in between by providing on-demand training or training at an introductory level. The companies who had developed separate departments to enhance microcomputer use were the same companies who stressed organization-wide gains in productivity. The author concluded from the survey results that the productive use of microcomputers is tied closely to the strategic plan of the organization, and the only way to maximize the benefits while reducing the problems of integrating the microcomputers into their organization is through education and support (22:19).

Summary

The literature revealed that although some computer training for managers was being accomplished, most managers did not perceive the training as adequate to meet their

needs. Most managers agreed that they needed training primarily in more general computer capabilities rather than specific computer applications or software programs. Civilian companies varied widely in the methods used for microcomputer training. The best training methods, based on survey responses, appeared to be in-house training geared toward increasing the managers' productivity.

III. Methodology

Introduction

The purpose of this research was to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency. Several methods were used to answer the investigative questions required in this thesis. Those questions were as follows:

1. Does the administration officer have job tasks that require computer skills? If so, how well can the officer perform the tasks?
2. What computer competency skills are required? How competent are current administration officers with each skill?
3. Have computer training courses been necessary to perform job related tasks? If so, what formal or informal training has the officer completed?
4. How has the automation of administrative functions changed the level of computer competency that administration officers need?
5. How does the level of computer literacy needed on the present job compare with the level needed in past jobs or assignments?

6. What computer applications and functions are most used or managed by administration officers?

A review of current literature revealed that mid-level and senior managers in the commercial business sector are concerned over the lack of computer training. Interviews and surveys conducted in the literature showed that managers acknowledged current job tasks which require computer skills and a majority of the managers felt that job requirements in the future would make computer knowledge and skills mandatory. Almost all of the managers believed that the current computer training provided by their companies, if any, was inadequate.

The comments from civilian managers/authors in the literature mirrored those often heard by the researcher from numerous U.S. Air Force administration officers. Those officers range from second lieutenant to colonel. The investigative questions concerning necessary computer competency skills and training requirements were based on comments made by junior officers during the researcher's assignment in Air Training Command as the course chief of the Administration Officer Course. This course is the entry level technical training course for officers (primarily second lieutenants) entering the administration career field. The researcher has been in contact with more than 85% of the officers entering the administration career field between June 1982 and April 1984. Many of the officers attending the course expressed surprise and

concern that introductory computer training was not included as part of the technical training for administration officers. During the same period of time, officers attending the Administration Officer Management Course voiced concern that they were not prepared to enter the computer age because of their lack of computer training. These officers, receiving mid-level management training in preparation for assignments as directors of administration, were primarily captains and majors. A telephone conversation with Capt Timothy Egan, Course Chief of the Administration Officer Management Course, confirmed that the majority of the students currently attending the course have little or no computer skills. Although a small amount of computer knowledge is included in the Administration Officer Management Course materials, there is no hands-on training opportunity available for the officers (6).

From 1984 to 1988, the researcher was assigned to the HQ Air Force Directorate of Information Management and Administration. The Director, Col Normand Lezy, voiced concern over the lack of computer training in the administrative career field as a whole, particularly after the career field was tasked in 1987 to develop and carry out an Air Force policy to manage written and electronic information.

Interviews with 10 administration officers from first lieutenant to major selectee echoed the same concerns over their lack of computer knowledge before attending AFIT. A list of these officers informally interviewed is found at Appendix A. The officers felt that future administrative job tasks would require more computer skills than most officers currently possess. Based on previous duties, these officers also felt that they could perform management tasks more efficiently and effectively if they had a greater amount of computer knowledge. So, from both the civilian sector and the military sector, administrative and managerial personnel have expressed concern over the lack of computer training for admin/managerial personnel. While studies existed in the civilian sector, no Air Force studies related to computer literacy of Air Force administration officers were found. This study sought to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency.

Justification of Survey Approach

A self-administered questionnaire was determined to be the best instrument for collecting data for this research effort. The survey provided a means for data collection from administration officers assigned in a wide range of

positions and locations. This approach was necessary to insure the data were not affected to a significant degree by assignment to a particular job, command level, or major command. The information gathered from the literature review, personal experiences of the researcher, and interviews was used to develop the items in the research questionnaire.

Population

The population of interest for this research was all Air Force company and field grade administration officers. Based on an interview with Lt Col Gregory Niehoff at SAF/AADH, this population contains approximately 2400 officers (20). The military rank of the population ranges from second lieutenant to colonel.

The administrative officer career field is divided into two distinct groups, executive support officers and functional administrators. Company grade executive support officers are identified with AFSC 7024; field grade in the same group are identified by AFSC 7016. Functional administrators also have two AFSCs, 7034 for company grade officers and 7046 for field grade. Functional administrators are normally assigned in positions functionally aligned under a director of administration, while executive support officers are assigned to every functional area in the Air Force. Because administration officers are encouraged to gain experience in both careers

areas, officers on the second or more jobs may have experience in both the functional and executive support areas. The command level of the population ranges from squadron level to the Office of the Secretary of the Air Force. According to Air Force MPC/DPMYI, the Administration career field currently contains the following population: 493 officers in duty AFSC 7016, 1,492 officers in duty AFSC 7024, 179 officers in duty AFSC 7034, and 148 officers in duty AFSC 7046 (9).

Sample

The sample used for this research was a random sample of administration officers currently assigned in the continental U.S. Overseas bases were not included in the sample because of the increased mailing and response times. The accuracy of the data was determined not to be significantly affected by the omission of overseas locations because the overseas administrative positions and duty descriptions do not differ from those in the continental U.S.

The sample of 383 was drawn from the Atlas Statistical Summary Inquiry for administration officers assigned to the base for two years or less and whose social security number ended with the randomly selected numbers one, two, three, or five. A formula was used for computing maximum sample size from a known population to achieve the confidence/reliability level of 95% (7:296). Based on a

CONUS population of approximately 1700 administration officers, an acceptable sample was determined to be 200. Officers selected from the data base using the four randomly selected numbers yielded a total of 383 officers which was determined to be a sufficient number. A two-year ceiling was used in an attempt to avoid officers in a permanent-change-of-station status. The resulting sample included officers from all four administration duty AFSCs, military ranks of second lieutenant to colonel, and duty positions from squadron level to the Office of the Secretary of the Air Force. Data collected from this sample provided a solid foundation for generalizing the research results for the population of administration officers.

The questionnaire was used as the data collection instrument with the knowledge that questionnaires have both strengths and weaknesses. Emory states that the quality of the data depends heavily on the ability and willingness of the respondents to cooperate. In fact, some respondents may feel obligated to provide information to the researcher when the most appropriate response would be 'no opinion' or 'don't know' [7,159]. However, one of the strengths of the questionnaire is that it is the most convenient and economical method for collecting data from a world-wide sample. For this research, personal or telephone interviews were not feasible because of economic and time constraints.

Questionnaire Design

The first step in developing the questionnaire was to review prior studies concerning computer literacy issues. No Air Force studies related to computer literacy could be located. Therefore, civilian studies were reviewed. Several surveys on computer literacy were found; these surveys were primarily from educational institutions to determine numbers and types of computer equipment being used by educational systems. The survey questions and the definition of terms were carefully reviewed to determine if they would be useful in an Air Force study. Since the majority of the survey questions measured 'numbers' of equipment instead of computer knowledge levels or computer literacy opinions, the surveys were not useful the preparation of this questionnaire.

A review of computer literacy texts revealed that almost all of them were designed to train users -- not determine attitudes and existing levels of computer literacy. One book, however, was located which included a computer literacy needs assessment survey developed and used by the author to determine training requirements (26:57). The researcher's advisor analyzed the survey and approved its style and format for use in constructing the questionnaire. After reviewing the survey questions, exploratory interviews were conducted with 10 administration officers. The officers ranged from first

lieutenant to major (selectee) with 2 to 18 years of active military service time (See Appendix A). The officers' responses to the interviews questions were used to outline specific areas of computer literacy to be addressed in the survey and to narrow the focus of the survey questions to those areas of most concern to administration officers. Prior surveys developed and used by AFIT/LSR were also used as guides for the format and instruction portions of the survey.

Reliability is a statistical analysis of the reproducibility of a measurement variable. It is normally made up of several items. The variable for this research effort was computer literacy, and several of the questionnaire items examining computer literacy were tested for reproducibility using Coefficient Alpha, a well known measure of reliability. Coefficient Alpha can range between 0 for a completely unreliable measure to +1.0 for a completely reliable measure. Coefficient Alpha for this study was computed at .81, well within the range of acceptability.

The survey instrument was composed of questions addressing five areas:

(1) Demographic questions to collect data on age, rank, sex, education, duty AFSC, and length of service;

(2) Experience and background questions to determine any past computer experience and education;

(3) Opinion questions to determine how the respondent feels about using a computer;

(4) Computer terms and concepts to determine a current level of knowledge;

(5) Computer terms and concepts to determine their importance to the respondent's job;

(6) Opinion questions to determine the respondent's preferred learning techniques.

The questionnaire was examined by three research experts in AFIT/LSR for content validity. Content validity refers to the extent to which a measuring instrument provides coverage of the topic being investigated (7:95). To insure content validity, the survey instrument was pretested by the thesis advisor and by 10 administration officers, who were currently AFIT graduate students and who were interested in the outcome of the survey (See Appendix A). After minor corrections, the thesis advisor again reviewed the instrument.

Construct validity refers to the accuracy of measuring what is desired and is much more difficult to insure than content validity (7:97). To help insure construct validity proven response alternatives were used to lessen the liklihood of bias. In addition, a pretest from the present survey population was conducted. There appeared to be adequate ability on the part of the students to answer the survey's knowledge level questions. This supports the notion that the survey instrument did contain construct

validity. After minor modifications and corrections, the questionnaire was sent to the Air Force Military Personnel Center for approval. A copy of the cover letter and questionnaire are attached at Appendix B.

The questionnaire was mailed to 382 administration officers. The researcher's name appeared in the random sample and was removed from the mailing list. Ten questionnaires were returned unanswered and 255 usable responses were received. The return rate of 68% was determined to be excellent, based on an expected rate of 50%. Thus, no follow up measures were determined to be needed.

Statistical Analysis

Analysis of the data was completed using the Statistical Package for the Social Sciences, version ten (SPSSX). SPSSX is an integrated system of programs designed for the analysis of social science data. SPSSX supports descriptive statistics, simple frequency distributions, and crosstabulations. It also contains procedures for simple correlation of both ordinal and interval data and allows the researcher to perform the analysis using natural language control statements. SPSSX provides a reasonably simple programming environment for most statistical procedures.

The data were analyzed using several different tests. Descriptive statistics were used to categorize nominal

level demographic data such as rank and duty AFSC. Frequency distributions were conducted on each question. In addition, analysis of variance (ANOVA) procedures were performed to determine if significant differences in computer literacy existed in various groups by rank and education level. Crosstabulations were performed on each question to display the data by using rank and educational level as variables. Crosstabulation is a joint frequency distribution of cases according to two or more classificatory variables (19:218). The frequency distributions provided by rank and educational level were analyzed to determine whether or not any of the variables were statistically independent.

Analysis of Variance (ANOVA) is a statistical test that identifies relationships between predictor and criterion variables. SPSSX command ONEWAY computes a one-way analysis of variance in a single continuous criterion variable for various levels of a variable. By comparing within group variability to the variability between the group means for the criterion variable, differences in the means of two groups or more can be shown (19:110). Once a difference is shown to exist, the Tukey multiple comparison technique can then be used to determine precisely where the significant statistical difference in means actually exists.

For this research the alpha level of .05 was used.

The findings from analysis of the data are found in Chapter IV.

IV. Analysis of Questionnaire Responses

Introduction

The research problem to be solved by this thesis was to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency. A questionnaire survey was determined to be most appropriate to collect the data required to solve the research problem. Chapter IV analyzes the collected data.

The response analysis is grouped according to the seven sections of the questionnaire. The sections of the questionnaire are analyzed by the following areas: demographic information, computer background/experience, opinions about microcomputers, knowledge about computer terms, importance of computer items, preferences for learning skills, and an open-ended question. Data from each section of the questionnaire are reported in a table which is followed by a general discussion of frequency distributions for each question.

Respondent Demographics

Part I of the questionnaire asked for demographic information about administration officers. The seven items include age, rank, sex, highest educational level, years of active military service, duty AFSC, and years in current

job. The frequency breakouts and general discussion of each demographic variable follow.

Age. Approximately one-half of the questionnaire respondents were grouped in the 31-40 age category. Eighty-six percent of first and second lieutenants were grouped in the 20-30 age category and 47% of the majors, lieutenant colonels and colonels were grouped in the over 40 age category. The frequency distribution of respondents by age is shown in Table I.

Table I

Age of Respondents

Age	Frequency	Percentage
20-30	79	31.0
31-40	129	50.6
Over 40	47	18.4
	255	100.0

Rank. Of the 255 questionnaire respondents, the single largest group by rank was captains with 121 or 47.5%. The smaller groups of lieutenant colonels and colonels which numbered 16 and 4 respectively, are representative of the population rank distribution within the administration career field. The frequency distribution of respondents by rank is shown in Table II.

Table II

Rank of Respondents

Rank	Frequency	Percentage
Second Lieutenant	50	19.6
First Lieutenant	29	11.4
Captain	121	47.5
Major	35	13.7
Lt Colonel	16	6.3
Colonel	4	1.6
	255	100.0

Sex. The respondents consisted of 171 males and 84 females. Males and females were distributed equally at the rank of second lieutenant and the distribution became more heavily weighted toward males as rank increased. At the rank of colonel, all four respondents were male. The frequency distribution of respondents by sex is shown in Table III.

Table III

Sex of Respondents

Sex	Frequency	Percentage
Male	171	67.1
Female	84	32.9
	255	100.0

Highest Educational Level. Of the 255 respondents, 117 or 45.9% reported a master's degree or higher. When education level was crosstabulated by rank, 88.6 percent of the lieutenants had a bachelor's degree or bachelor's degree plus, 58.9 % of the captains and majors had a master's degree or master's degree plus, and 75% of the lieutenant colonels and colonels had a master's degree or higher. One captain and one lieutenant colonel reported a doctoral degree. The frequency distribution of respondents by educational level is shown in Table IV.

Table IV

Educational Level of Respondents

Educational Level	Frequency	Percentage
Bachelor's degree	65	25.5
Bachelor's degree +	73	28.6
Master's degree	96	37.6
Master's degree +	19	7.5
Doctoral degree	2	.8
	255	100.0

Active Military Service. Questionnaire respondents varied widely in years of active military service. Fifty officers reported less than three years of service while 79 officers had 15 or more years of active military service. When years of service were crosstabulated with rank, the results showed that 56 of 121 captains had 12 or more years

of active service and 40 captains had 15 years or more of active military service. The unexpected high number of captains with 15 or more years of service indicates that as many as 40% of the captains may have had prior enlisted active duty service. The frequency distribution of active military service is shown in Table V.

Table V

Years of Active Military Service

Years of Active Military Service	Frequency	Percentage
Less than 3 years	50	19.6
3 years, but less than 6	22	8.6
6 years, but less than 9	34	13.3
12 years, but less than 15	32	12.5
15 years or more	79	31.0
	255	100.0

Duty AFSC. All four administrative AFSCs, 7024, 7016, 7034, and 7046, as defined in chapter III, were represented by the questionnaire respondents. Over 77% of the respondents were assigned as a company or field grade executive support officer and 11.7% were assigned as a company or field grade functional administrator. About 10% of the respondents identified their duty AFSC as other than 70XX. The distribution of the AFSCs is consistent with distributions received in March 1988 from AFMPC/DPMYI. At

that time, 85% of Air Force administration officers were assigned in executive officer AFSCs and 15% were assigned as functional administrators (9). The frequency distribution of duty AFSCs is shown in Table VI.

Table VI

Duty AFSCs of Respondents

Duty AFSC	Frequency	Percentage
7024	157	61.6
7034	18	7.1
7016	41	16.1
7046	12	4.7
Other	27	10.5
	255	100.0

Years in Current Job. Officers for the research sample were selected from the Atlas Statistical Summary Inquiry data base using time on station of two years or less as one constraint to avoid seasonal moves. As expected, 88% of the respondents reported 'less than 1 year' or '1 year but less than 2 years' in their current job. The frequency distribution of respondents by years in current job is shown in Table VII.

Table VII

Years in Current Job of Respondents

Years in Current Job	Frequency	Percentage
Less than 1 year	129	50.6
1 year but less than 2	96	37.6
2 years but less than 3	21	8.2
3 years but less than 4	2	.8
4 years or more	7	2.7
	255	100.0

Computer Background/Experience

Part II of the questionnaire, containing questions 8 through 20, asked the respondents for true/false responses on information concerning their background and experience with computers. Responses for each question were crosstabulated with rank and educational level. The most meaningful trends were found in the rank levels. These trends are included in the discussion of the questionnaire items or shown in relevant tables. A complete frequency distribution for Part II is shown in Appendix C, Table XXVII.

Table VIII

Computer Background and Experience

Question	Frequency	Percentage
Never used a microcomputer		
Yes	35	13.7
No	220	86.3
	255	100.0
Own and use a computer		
Yes	97	38.0
No	158	62.0
	255	100.0

Table VIII shows that more than 86% of the respondents have used a microcomputer and 62% of the respondents own and use a computer at home.

Table IX

Computer Use on the Job

Rank	Yes	Percent	No	Percent
2d Lt	37	74%	13	26%
1st Lt	17	58%	12	42%
Capt	78	64%	43	36%
Maj	19	54%	16	46%
Lt Col	7	43%	9	57%
Col	4	100%	0	0%

As shown in Table IX, company grade officers are significant users of computers on the job with nearly three-fourths of second lieutenants and two-thirds of captains identifying themselves as computer users on the job. Yet when asked if they considered themselves computer literate, exactly 50% of the company grade officers felt they were not computer literate as shown in Table X.

Table X

Computer Literacy

Rank	Yes	Percent	No	Percent
2d Lt	34	68%	16	32%
1st Lt	15	52%	14	48%
Capt	51	42%	70	58%
Maj	18	51%	17	49%
Lt Col	9	56%	7	44%
Col	3	75%	1	25%

Thus, this data is representative of the 'typical' respondent who is a male captain, 31-40 years old, holding a Master's degree, has 15 or more years of service, and holds a 7024 AFSC with less than one year in his current position.

Table XI

Formal Training

Rank	Software Package		Information Management		Data Processing	
	Yes	%	Yes	%	Yes	%
2d Lt	26	52%	15	30%	18	36%
1st Lt	12	41%	10	34%	6	21%
Capt	48	40%	49	40%	35	29%
Maj	14	40%	15	42%	12	34%
Lt Col	9	56%	10	62%	4	25%
Col	2	50%	1	25%	1	25%

Table XI shows that, in general, officers at all ranks have had more formal training in software packages than in information management or data processing. The one exception is in information management where 62% of the lieutenant colonels have had formal training.

Table XII

Source of Computer Training

Question	Frequency	Percentage
Computer knowledge is self-taught		
Yes	152	59.6
No	103	40.4
	255	100.0

Table XII (Cont)

Question	Frequency	Percentage
Training in systems analysis and design		
Yes	35	13.7
No	220	86.3
	255	100.0
Acquired computer skills prior to Air Force		
Yes	66	25.9
No	189	74.1
	255	100.0
Acquired computer skills after entering Air Force		
Yes	182	71.4
No	73	28.6
	255	100.0
Acquired computer skills through AF training		
Yes	66	25.9
No	189	74.1
	255	100.0

Table XII shows that over 59% of the computer knowledge of the respondents was self-taught and was acquired after entering the Air Force. There appears to be a connection between computer skills and Air Force jobs because only 25.9% of the respondents acquired computer skills before entering the Air Force. A crosstabulation by

rank revealed that a significantly higher number of second lieutenants (74%) acquired computer skills before entering the Air Force than any of the other ranks. This substantial difference may be attributed to the recent increase in the widespread use of computers by educational facilities as well as the Air Force.

One hundred eighty two or 71.4% of the respondents indicated that they acquired computer skills after entering the Air Force, but only 25.9% of the respondents indicated they received Air Force training to develop computer skills. This difference of 46.5 points indicates that Air Force administration jobs may require the administration officer to have computer skills but the Air Force does not provide the training.

Opinions About Microcomputers

Part III of the questionnaire asked the respondents opinions about the introduction of the microcomputer to the person's work environment. The respondents' opinions were measured on a continuous scale where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. The frequency distributions are shown in Appendix C, Table XXVIII. These questionnaire responses were also crosstabulated by rank and educational level. Again, the most meaningful findings were by rank. The most significant findings to this study are shown in

the following tables or are included in the discussion of the questionnaire items.

Table XIII

Perceived Computer Literacy of Officers

Question	Frequency	Percentage
Consider self computer literate		
2d Lt	30	40%
1st Lt	14	48%
Capt	45	37%
Maj	17	49%
Lt Col	9	56%
Col	3	75%

Table XIV

Importance of Computer Literacy in Job

Question	Frequency	Percentage
Computer Literacy Important in Job		
2d Lt	29	58%
1st Lt	16	55%
Capt	69	57%
Maj	19	54%
Lt Col	8	50%
Col	3	75%

The majority of officers at all ranks agreed that computer literacy is important in their jobs as shown in Table XIV. But less than half of the company grade officers perceived themselves to be computer literate. At the rank of captain, only 37% considered themselves computer literate as shown in Table XIII. These numbers were consistent with the responses in Part II of the questionnaire where 51% of the total respondents considered themselves computer literate based on their computer background and training.

Despite the officers' perceived lack of computer literacy, Table XV shows that officers in all ranks use the computer to improve administrative functions. The officers in all ranks also believed that more computer training would improve their job efficiency and that computer knowledge is important as shown in Table XVI.

Table XV

Computer Use in Job

Question	Frequency	Percentage
Used computer to improve admin functions		
2d Lt	37	74%
1st Lt	21	72%
Capt	83	69%
Maj	21	60%
Lt Col	10	63%
Col	3	75%

Table XVI

Importance of Training and Computer Knowledge

Question	Frequency	Percentage
More training would improve efficiency		
2d Lt	41	82%
1st Lt	25	86%
Capt	104	86%
Maj	31	89%
Lt Col	14	88%
Col	3	75%
Computer knowledge is important		
2d Lt	44	88%
1st Lt	25	86%
Capt	106	88%
Maj	32	91%
Lt Col	13	81%
Col	4	100%

Although officers perceive that they need more training, the officers also believe they can still generally meet job demands with their current level of computer knowledge as shown in Table XVII.

Table XVII

Ability to Meet Current Job Demands

Question	Frequency	Percentage
Cannot meet job demands with present computer knowledge		
2d Lt	12	24%
1st Lt	4	14%
Capt	34	28%
Maj	11	31%
Lt Col	2	13%
Col	1	25%

On training issues, officers believe that formal computer training should be included in administrative technical training courses as shown in Table XVIII. Table XIX shows that officers reported less support for on-the-job training than classroom training.

Table XVIII

Computer Training in Technical Training Courses

Question	Frequency	Percentage
Include computer training in technical training courses		
2d Lt	42	84%
1st Lt	22	76%
Capt	111	92%
Maj	30	86%
Lt Col	15	94%
Col	4	100%

Table XIX

Training [illegible]erences

Question	Frequency	Percentage
OJT training better than in classroom		
2d Lt	21	42%
1st Lt	15	52%
Capt	46	38%
Maj	14	40%
Lt Col	8	50%
Col	2	50%

Summary of Part III

Part III of the questionnaire shows that slightly less than one-half of the respondents consider themselves computer literate.

More than 56% of the respondents agree that computer literacy is important in their present job. This is approximately the same percentage (55.3%) who feel comfortable using the computer. The respondents indicated they have used the computer to improve job efficiency, and over 85% believe that additional computer training could improve their job effectiveness even more. Over 87% believe that computer knowledge is important for managing automated functions and over three-fourths indicated that more computer knowledge would make them better able to manage automated administration job functions. The officers also indicated that automation of administrative functions has increased the amount of computer knowledge they need to do their job well. An overwhelming majority of the respondents (95.3%) believe that computer knowledge will be even more important for the administration officer in the future; however, over one-half of the officers believe they have enough computer knowledge to meet current job demands.

The respondents who had a preference on training issues preferred classroom training to on-the-job training. About one-third indicated no preference for either method. Over 87% of the respondents believe formal computer training should be part of the technical training courses for administration officers.

Knowledge About Computer Terms

Part IV of the questionnaire asked the respondents to indicate their level of knowledge about a list of computer terms, and concepts. The scale was numbered from 1 to 6 with 1 = I am not familiar with this and 6 = I know quite a bit about this. The frequency distributions of questions 34 through 53 are shown in Table XX.

Table XX

Knowledge of Computer Terms

Term or Concept	Frequency	Percentage
Microcomputer		
1	16	6.3
2	31	12.2
3	62	24.3
4	68	26.7
5	47	18.4
6	31	12.2
	255	100.0
Mainframe computer		
1	37	14.5
2	55	21.6
3	61	23.9
4	62	24.3
5	24	9.4
6	16	6.3
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
Floppy diskette		
1	9	3.5
2	24	9.4
3	41	16.1
4	57	22.4
5	66	25.9
6	58	22.7
	255	100.0
Disk drive		
1	12	4.7
2	27	10.6
3	42	16.5
4	60	23.5
5	62	24.3
6	52	20.4
	255	100.0
Bit		
1	33	12.9
2	36	14.1
3	52	20.4
4	58	22.7
5	40	15.7
6	36	14.1
	255	100.0
Byte		
1	34	13.3
2	34	13.3
3	49	19.2
4	61	23.9
5	42	16.5
6	35	13.7
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
Baud rate		
1	122	47.8
2	27	10.6
3	29	11.4
4	29	11.4
5	21	8.2
6	27	10.6
	255	100.0
Operating systems		
1	44	17.3
2	42	16.5
3	63	24.7
4	48	18.8
5	31	12.2
6	27	10.6
	255	100.0
Hardware		
1	9	3.5
2	30	11.8
3	50	19.6
4	53	20.8
5	62	24.3
6	51	20.0
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
Software		
1	5	2.0
2	28	11.0
3	50	19.6
4	57	22.4
5	60	23.5
6	55	21.6
	255	100.0
Word Processing		
1	4	1.6
2	17	6.7
3	31	12.1
4	52	20.4
5	74	29.0
6	77	30.2
	255	100.0
Electronic spreadsheet		
1	56	22.0
2	43	16.9
3	48	18.8
4	48	18.8
5	34	13.3
6	26	10.2
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
Database		
1	23	9.0
2	50	19.6
3	45	17.6
4	66	25.9
5	41	16.1
6	30	11.8
	255	100.0
Interface		
1	31	12.2
2	43	16.9
3	63	24.7
4	56	22.0
5	37	14.5
6	25	9.8
	255	100.0
Random access memory (RAM)		
1	40	15.7
2	51	20.0
3	56	22.0
4	40	15.7
5	41	16.1
6	27	10.6
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
Read only memory (ROM)		
1	51	20.0
2	56	22.0
3	45	17.6
4	39	15.3
5	40	15.7
6	24	9.4
	255	100.0
Local Area Network (LAN)		
1	79	31.0
2	50	19.6
3	40	15.7
4	38	14.9
5	28	11.0
6	20	7.8
	255	100.0
Program language		
1	38	14.9
2	60	23.5
3	65	25.5
4	39	15.3
5	29	11.4
6	24	9.4
	255	100.0

Table XX (Cont)

Term or Concept	Frequency	Percentage
System Analysis		
1	72	28.2
2	65	25.5
3	61	23.9
4	34	13.1
5	7	2.7
6	16	6.3
	255	100.0
System design		
1	71	27.8
2	76	29.8
3	51	20.0
4	31	12.2
5	9	3.5
6	17	6.7
	255	100.0

The computer terms and concepts in Part IV of the questionnaire were presented in order from simple to complex. Respondents indicated more knowledge on the area of microcomputer and associated concepts such as floppy diskette and disk drive. Among software applications, respondents generally indicated the most knowledge about word processing and the least about electronic spreadsheets. Respondents indicated the least amount of knowledge of all

the concepts in programming languages and systems analysis and design.

The terms and concepts from Part IV were ranked in order of level of knowledge by respondents. Terms/concepts receiving the most 1's on the scale were ranked first; those receiving the second most 1's were ranked second, etc. Respondents had the least knowledge about the computer terms and concepts shown in Table XXI.

Table XXI

Least Knowledge of Computer Terms/Concepts

	Term/Concept	Frequency
1.	Baud Rate	122
2.	Local Area Network	79
3.	System Analysis	72
4.	Electronic Spreadsheet	56
5.	Read Only Memory	51
6.	Operating Systems	44
7.	Random Access Memory (RAM)	40
8.	Program Language	38
9.	Mainframe Computer	37
10.	Byte	34
11.	Bit	33
12.	Interface	31

Terms/concepts receiving the most 6's on the scale were also ranked; those receiving the most 6's were ranked first, those receiving the second most 6's second, etc. Respondents had the most knowledge about the computer terms and concepts shown in Table XXII.

Table XXII

Most Knowledge of Computer Terms/Concepts

	Term/Concept	Frequency
1.	Word Processing	77
2.	Floppy Diskette	58
3.	Software	55
4.	Disk Drive	52
5.	Hardware	51
6.	Bit	36
7.	Byte	35
8.	Microcomputer	31
9.	Database	31

The terms bit and byte appear in both ranked lists of most and least knowledge with approximately the same frequency. The other approximately 73% of the respondents fall between the parameters of 1 = I am not familiar with this and 6 = I know quite a bit about this.

Importance of Computer Terms and Concepts to Job

In part V of the questionnaire, the respondents were given the same list of computer terms and concepts used in Part IV of the questionnaire and asked to rate them on importance to their job using a scale of 1 to 6. On the scale 1 = This is very unimportant to my job and 6 = This is very important to my job. The frequency distributions of items 54 through 73 are shown in Table XXIII.

Table XXIII

Importance of Computer Terms to Job

Term or Concept	Frequency	Percentage
Microcomputer		
1	23	9.0
2	20	7.8
3	45	17.6
4	45	17.6
5	55	21.6
6	67	26.3
	255	100.0
Mainframe computer		
1	75	29.4
2	62	24.3
3	45	17.6
4	30	11.8
5	26	10.2
6	17	6.7
	255	100.0
Floppy diskette		
1	22	8.6
2	19	7.5
3	38	14.9
4	52	20.4
5	54	21.2
6	70	27.5
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
Disk drive		
1	23	9.0
2	17	6.7
3	36	14.1
4	60	23.5
5	49	19.2
6	70	27.5
	255	100.0
Bit		
1	57	22.4
2	43	16.9
3	61	23.9
4	41	16.1
5	24	9.4
6	29	11.4
	255	100.0
Byte		
1	58	22.7
2	45	17.6
3	55	21.6
4	40	15.7
5	28	11.0
6	29	11.4
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
Baud rate		
1	96	37.6
2	49	19.2
3	47	18.4
4	33	12.9
5	16	6.3
6	14	5.5
	255	100.0
Operating systems		
1	42	16.5
2	41	16.1
3	46	18.0
4	50	19.6
5	31	12.2
6	45	17.6
	255	100.0
Hardware		
1	25	9.8
2	18	7.1
3	47	18.4
4	44	17.3
5	58	22.7
6	63	24.7
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
Software		
1	20	7.8
2	15	5.9
3	35	13.7
4	55	21.6
5	55	21.6
6	75	29.4
	255	100.0
Word processing		
1	16	6.3
2	12	4.7
3	13	5.1
4	33	12.9
5	51	20.0
6	130	51.0
	255	100.0
Electronic spreadsheet		
1	58	22.7
2	55	21.6
3	46	18.0
4	39	15.3
5	27	10.6
6	30	11.8
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
Database		
1	33	12.9
2	32	12.5
3	36	14.1
4	47	18.4
5	50	19.6
6	57	22.4
	255	100.0
Interface		
1	42	16.5
2	41	16.1
3	58	22.7
4	44	17.3
5	35	13.7
6	35	13.7
	255	100.0
Random access memory (RAM)		
1	58	22.7
2	41	16.1
3	55	21.6
4	36	14.1
5	32	12.5
6	33	12.9
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
Read only memory (ROM)		
1	65	25.2
2	46	18.0
3	58	22.7
4	37	14.5
5	25	9.8
6	24	9.4
	255	100.0
Local Area Network (LAN)		
1	75	29.4
2	42	16.5
3	44	17.3
4	33	12.9
5	31	12.2
6	30	11.8
	255	100.0
Program language		
1	63	24.7
2	53	20.8
3	50	19.6
4	38	14.9
5	25	9.8
6	26	10.2
	255	100.0
System Analysis		
1	73	28.6
2	67	26.3
3	41	16.1
4	36	14.1
5	20	7.8
6	18	7.1
	255	100.0

Table XXIII (Cont)

Term or Concept	Frequency	Percentage
System design		
1	70	27.5
2	63	24.7
3	41	16.1
4	35	13.7
5	23	9.0
6	23	9.0
	255	100.0

Computer concepts and terms were also ranked in order of their importance to respondent's jobs. The most important term/concept is ranked first, the second most important next, etc. Respondents considered the following terms/concepts in Table XXIV most important to their jobs.

Table XXIV

Computer Terms/Concepts Most Important to Job

	Term/Concept	Frequency	
1.	Word Processing	130	
2.	Software	75	
3.	Floppy Diskette	70	
4.	Disk Drive	70	
5.	Microcomputer	67	
6.	Hardware	63	
7.	Database	57	
8.	Operating Systems	45	*
9.	Interface	35	*
10.	Random Access Memory	33	*
11.	Electronic Spreadsheet	30	*
12.	Local Area Network	30	*

Those starred items indicate terms/concepts rated in the top 12 as both important to their job and where respondents felt they lacked adequate knowledge. Five items appear in both rankings. The data appear to indicate that a gap may exist between what is needed in computer skills with regard to selected computer concepts and skills and what is known by administration officers. Fortunately, the discrepancy appears low in the rankings indicating the discrepancy may not be a serious one yet.

The terms/concepts were also ranked in order of least importance to the respondent's job. Least important terms/concepts to the respondents' jobs are shown in Table XXV.

Table XXV

Terms/Concepts Least Important to Job

	Term/Concept	Frequency
1.	Baud Rate	96
2.	Local Area Network	75
3.	Mainframe Computer	75
4.	Systems Analysis	73
5.	System Design	70
6.	Read Only Memory	65
7.	Program Language	63
8.	Random Access Memory	58
9.	Byte	58
10.	Electronic Spreadsheet	58
11.	Bit	57

Almost half of the respondents rated the microcomputer and associated components such as floppy diskette and disk drive important to their job. Software knowledge was considered important to the job and over 70% of the respondents considered word processing important. As in Part IV, more technically complex areas such as local area networks and system analysis and design were not considered high in job importance. This section of the questionnaire indicateed that administration officers believe that basic microcomputer knowledge and the capability to use standard software programs such as word processing and data base are the most important skills required in their jobs.

Preferences in Learning

Part VI of the questionnaire asked respondents to indicate preferences in learning skills by using the scale

1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. The frequency distributions of the responses are shown in Appendix C, Table XXIX.

The preferred method of learning for the respondents was by working in a group instead of alone and learning by doing. The respondents preferred specific instructions instead of general guidelines for learning and preferred to know the theories and principles behind the skill they were learning.

Data were examined through Analysis of Variance (ANOVA) to determine significant statistical differences by rank and educational level. These significant variables are shown in Table XXVI.

To help determine the perceived competency by rank and educational level of current administration officers with computer skills, the Analysis of Variance (ANOVA) test was used. Demographic data from the survey questionnaire allowed the variance in the variables under study to be separated using ANOVA. Table XXVI shows the significant statistical differences found between all non demographic variables and groups derived from the demographic variables of military rank (2d Lt, 1st Lt, Capt, Maj, Lt Col, and Col) and educational levels (Bachelor's, Bachelor's plus, Master's, Master's plus, and Doctorate). Thus, rank and education level served as the independent or predictor

variables and each relevant non-demographic variable served as the criterion variable. For ANOVA, the hypothesis Ho is that all group means are equal, i.e., for rank M1 = M2 = M3 = M4 = M5 = M6 and for educational level, M1 = M2 = M3 = M4 = M5. The alternative hypothesis is that at least one mean is significantly different from the others. ANOVA determines if a significant statistical difference exists, and the Tukey multiple comparison test shows where the specific difference(s) exist. Table XXVI shows only statistically significant values.

Table XXVI

Significant Group Differences

Group Variable	Criterion Variable	F-Ratio	Probability of F
<u>Rank</u>			
Capt vs Maj	Work Alone Best	2.44	.035
2Lt vs 1Lt Maj vs 2Lt Maj vs 1Lt Capt vs 2Lt Capt vs 1Lt Lt Col vs 2Lt Lt Col vs 1Lt	Had Computer Skills Prior to AF	28.94	.000
2Lt vs Capt	Comfortable Using Computer	3.15	.009
Lt Col vs 2Lt Col vs 2Lt	Received skills through Air Force	3.91	.002

Table XXVI (Cont)

Group Variable	Criterion Variable	F-Ratio	Probability of F
Educational Level			
BS vs MS +	Baud Rate	2.50	.04
BS vs MS	Skills Prior to Air Force	5.33	.0004
BS vs MS +	System Analysis	3.65	.0065
BS vs MS	Importance of Software	3.32	.01
BS vs MS	Learn by Doing	4.36	.002
MS vs MS + BS vs MS +	Data Processing Course	2.51	.04

Table XXVI shows that grouping respondents by rank and education level helped to explain significant amounts of variance. The data show that captains prefer to work alone when learning a skill and that second lieutenants were significant different from first lieutenants, captains, majors, lieutenant colonels, and colonels in their personal knowledge of computer skills. Second lieutenants felt they had skills prior to entering the Air Force. All others learned computer skills after they came on active duty. When grouped by educational level, officers holding a Bachelor's degree had more computer skills before entering the Air Force. Officers holding a Master's degree plus had

received more training in systems analysis and data processing than officers holding a bachelor's degree. Those officers with a master's degree believed knowledge of software was more important than did officers with a bachelor's degree.

Open-Ended Question

Part VII of the questionnaire asked the respondents to comment on any concerns they had about computer literacy that were not covered in the questionnaire. Of the 255 respondents, 102 included comments. More than one-half of the comments were concerned with the lack of computer training available. One respondent commented that "understanding computers is essential to all we [administration officers] do and computer skills courses must be mandatory in technical training school programs and all graduate programs such as AFIT." Respondents commented they have received computer equipment and software applications, but have been unable to receive even a limited amount of training to put the equipment to use. Several respondents described themselves as "frustrated" over the lack of available computer training. Thus, respondents cited a "definite need for people already in the field to receive training." Another respondent commented, "I'm behind the power curve. If I understood computers better, I would be more likely to use them to do daily business."

Administration officers consider the computer the 'wave of the future' and believe that all aspects of computer science will become important in the near future to bring administrators out of the 'stubby pencil mode.' One respondent commented that 'knowledge of multi-user systems and local area networks will be critical in the future. Electronic flow of information is a logical successor to moving paper via BITS [Base Information Transfer System].'

Comments on training preferences indicate that 'formal classroom training is better for overall familiarization and terminology, while OJT is best for specific job applications.' Officers perceive that 'administration officers need formal and hands-on computer training badly' and agree that if administration officers are to remain successful in dealing with rapidly changing technology, 'we must vigorously attack our computer literacy problem.'

Summary

The largest single group of questionnaire respondents were captains with a master's degree or higher and 9 years or more of active military service. The majority of the respondents were assigned as a company or field grade executive support officer with less than two years in the current job. Over 60% of the respondents used a computer on the job and the majority believe that additional training would improve their job effectiveness. Only about

one-fourth of the respondents had received Air Force computer training. The respondents generally believed that computer skills will become more important as more administrative functions become automated. ANOVA showed there are significant statistical group differences both in rank and educational level. Second lieutenants were significantly different from all other ranks in their knowledge of computer skills. Based on educational level, officers with a Bachelor's degree had more computer skills prior to entering the Air Force than officers with a Master's degree. Officers with a Master's degree plus had more training in system analysis and data processing than officers with a Bachelor's or Master's degree. Respondents indicated by comments that they believe formal hands-on computer training should be included in administrative technical training courses and some type of computer training should be available to those administration officers already beyond the technical training programs. Respondents appeared to be frustrated over the lack of training available, especially when microcomputer equipment and software applications are becoming readily available at every command level. One of the areas of most concern was the lack of basic microcomputer knowledge needed to manage existing automated systems. The respondents also expressed concern over the management of future information management systems which will require an even deeper level of computer knowledge.

V. Summary of Findings, Recommendations and Conclusions

Significance of Results

Little research has been accomplished prior to this effort in determining the perceived level of computer skills held by Air Force administration officers. This research was developed to provide an initial base of knowledge so that programmatic research efforts could follow.

The need for USAF Administration Officers to possess computer skills is growing as the Air Force use of microcomputers becomes more widespread and more administrative functions become automated. Administration officers in their role as administration managers must determine what level of computer literacy they need to manage the increasing number of automated functions and what training methods will best meet those needs. The literature supported surveying administration officers to determine what level of computer knowledge they now have and what training methods they believe are appropriate to give them a level of knowledge suitable to successfully meet job demands. This study used a questionnaire format to determine current levels of computer literacy and computer training needs as the administration officers perceive them. One conclusion of this research is that the sample of respondent Air Force administration officers do not have a strong formal background in computer skills.

To determine current levels of computer literacy and perceived training needs, several investigative questions were addressed:

1. Does the administration officer have job tasks that require computer skills? If so, how well can the officer perform the tasks?

2. What computer competency skills are required? How competent are current administration officers with each skill?

3. Have computer training courses been necessary to perform job related tasks? If so, what formal or informal training has the officer completed?

4. How has the automation of administrative functions changed the level of computer competency that administration officers need?

5. How does the level of computer literacy needed on the present job compare with the level needed in past jobs or assignments?

6. What computer applications are most used or managed by administration officers?

Investigative Question One. Administration officers have job tasks which require them to have computer skills. More than 63% of the administration officers report that they use the computer on the job with company grade officers identifying themselves as significant on-the-job computer users. Over 56% of the administration officers

report that they consider computer knowledge important in their jobs and more than 68% believe they are doing their current jobs more effectively because of their ability to use the computer. However, in spite of the fact that officers are using the computer and believe the computer improves their effectiveness on the job, only about one-half of the administration officers are comfortable using the computer and less than one-half perceive themselves as computer literate. Over 85% of the administration officers believe that more computer training would improve their on-the-job effectiveness. About 25% of the administration officers report current job demands that they cannot effectively meet with their current level of computer knowledge.

Investigative Question Two. Survey data indicate that administration officers believe two types of computer skills are required: (1) general computer and systems knowledge necessary for being an effective manager of automated systems, and (2) knowledge about microcomputers, associated hardware components, and standard software applications to improve individual job efficiency. Word processing, database, and the general term 'software' were identified by the administration officers as the most important software skills in their jobs. Microcomputers and associated hardware components were also ranked high on the list of term/concepts most

important to the job. When asked to indicate knowledge levels for the computer term/concepts, the same software and hardware items appear at the top of the list. However, the amount of knowledge the administration officers perceive that they have about the terms/concepts is not high. For example, word processing was identified most frequently as the term for which respondents had the most knowledge. On the rating scale, only 30.2% reported they knew 'quite a bit about this.' In fact, when the frequencies for the two highest knowledge levels on the scale (5 and 6) for each term/concept were combined, none of the combined frequencies equaled 50% of the respondents. Thus, even in the terms/concepts that administration officers identified as knowing most about, in every instance less than 50% officers perceived themselves as having adequate knowledge to be competent with the skill.

Investigative Question Three. Computer training appears to be necessary for administration officers to perform job tasks. More than 70% of the administration officers acquired computer skills after entering the Air Force. Almost two-thirds of the administration officers reported their computer knowledge was from informal training and was typically self-taught. About 40% of the administration officers have had at least one formal computer training course with the greatest amount of formal training in software packages. Formal training has been

obtained primarily from sources outside of the Air Force with only about 25% of the officers having acquired computer skills through Air Force training.

Investigative Question Four. Over 70% of the administration officers reported that the automation of administration functions has raised the level of computer competency that they need. Over 87% of the administration officers believe that computer knowledge is important for managing automated functions. Officers commented in the survey that as electronic management of information moves to base level, more administrators will become the system managers and will be expected to make effective management decisions about system performance. Without an appropriate level of computer training, the administration officers cannot successfully manage the automated functions and perform job tasks more efficiently. Based on the continuing movement in the administrative career field toward automation and electronic management of information, more than 95% of the officers believe that computer literacy for administration officers will become even more important in the future. No only must the administration officer be able to manage purely administrative functions, but he must also deal with systems linking administration with other functional areas such as Personnel and the Accounting and Finance Office.

Investigative Question Five. About 38% of the administration officers reported that computer literacy is more important in their present job than in past assignments. The officers' survey responses and comments indicate that most officers, up to this time, have been able to generally meet job demands for computer literacy. However, over 95% of the officers believe that as officers move toward future assignments and the career field moves toward its new charter of Air Force information resource management, higher levels of computer literacy will be mandatory for administration officer to successfully function as information managers.

Investigative Question Six. Survey responses indicate that administration officers are using word processing and other microcomputer software applications most frequently on the job. Few of the officers are currently managing information systems. Only about 4% of the administration officers surveyed are currently assigned to a position that requires them to hold a 'C' (computer) prefix.

Recommendations

The survey responses in this study indicated that more than 95% of the administration officers believe that technical training courses for administration officers should include computer training. Recommendations are discussed separately for the two existing courses technical training courses.

Administration Officer Course. This course is the entry-level technical training course attended by most officers entering the administration career field. Basic hands-on computer orientation training should be a mandatory part of course to insure that officers entering the administration career field have a general knowledge of computer hardware and software concepts and terminology. The training in this course should provide familiarization with standard Air Force computer hardware concepts and standard software applications such as those offered in the standard Air Force multi-user contract. Specific software applications should not be taught in detail, but students should be introduced to the types of applications identified by the survey as the most commonly used software, such as word processing and data base programs. The introduction to software applications should focus on exploring methods of using the software to help the officer perform common administrative job tasks more effectively and efficiently.

Some survey respondents commented that their lack of knowledge in basic concepts and terminology made it difficult to understand and utilize the documentation accompanying the computer hardware and software. Training in key concepts and terms would help solve this problem and permit administration officers to continue self-training efforts in hardware and software applications relevant to

their specific job after they reach the first administrative assignment.

Administration Management Officer Course. The Administration Officer Management Course is a technical training course provided for administration officers in their initial assignment as a director of administration (DA) or as a deputy director or branch manager within the DA function. Survey responses to this study indicate that administration officers believe a higher level of computer knowledge is necessary to successfully manage automated administration functions than is needed to use computer applications on the job. Several administrative functions either have already been automated or are currently in the process of being automated. Standard Air Force automated administration programs include the Publication Distribution Office System (PDOS) and the Records Information Management System (RIMS). These functions fall under the responsibility of the base director of administration (DA). Therefore, hands-on training should be included in the Administration Management Officer Course to insure that DAs are familiar both with basic computer terms and concepts, and with the automated systems and concepts which fall under their responsibility. Although DAs do not need a level of training sufficient to fully operate the programs, they do need enough basic knowledge of the systems to give them the tools necessary to evaluate

and manage the operation of the automated systems and to identify and evaluate other administrative tasks for possible automation efforts.

Other Computer Education Training. The survey data from this study identified the group of officers who perceived themselves most in need of computer skills as captains assigned in a 7024 duty position. A lower percentage of captains perceived themselves computer literate than any other rank; yet, this group of officers constitutes the largest group within the administration career field. The majority of these officers have already attended or by-passed the Administration Officer Course and are not eligible because of their duty AFSC to attend the Administration Officer Management Course. Therefore, at this time, computer training for this group of administration officers is the most critical in need. Administration officers identified through the survey data that the basic computer terms and concepts most important to their jobs are word processing, software skills, and hardware familiarity. Computer orientation courses should be readily available through training programs set up within each MAJCOM or SOA. Preferably, this training should be available at base level and cover the same basic operations and terminology as those covered in the Administration Officer Course. In addition, this training should orient administration officers to systems or

software programs that are unique to the command or base.

Future Research

This study has documented that the majority of Air Force administration officers have little or no formal computer training. It has also documented that the Air Force administration officers in this study believe formal computer training would help them perform their jobs better. The next step would be to identify and develop training courses to correct computer knowledge deficiencies based on the data gathered for this research. Future research should focus on developing specific training outlines to be implemented by the Administration Officer Course and the Administration Management Officer Course. In addition, a training outline should be developed as a guideline for MAJCOMs, bases, or other organizations to implement training for both general computer concepts and command-unique systems or programs.

There are several possible sources where information could be gathered to aid in the identification and development of computer training courses for administration officers. First, the literature review in this study identified both in-house and contract training programs which are being used to train administrators and managers in civilian industry. A review of some of these training programs would provide examples in both content and methodology used for teaching computer skills. These

programs could be examined for potential usefulness for training Air Force administration officers. Administration officers with recent assignments to the Education with Industry (EWI) program could provide information on the types of computer training programs being used by major corporations.

The effectiveness of contracting computer training programs in the Air Force could also be explored through contact with the 7th Communications Group (7CG) in the Pentagon, where computer training contracted from civilian organizations has been used to train Air Force officers assigned in the Washington DC area.

Another possible source of computer training information would be the examination for potential value of successful computer training programs that have been implemented by any Air Force functions at MAJCOM or base level.

Other sources to explore for existing computer training programs are the other services and DOD. The DOD Computer Institute (DODCI), located at the Washington Navy Yard in Washington DC, offers numerous types of computer orientation and computer system training courses to both military and civilian government personnel.

The review and examination of existing computer training courses such as those mentioned is a logical step in identifying and developing training courses to correct

the computer knowledge deficiencies of Air Force administration officers.

Appendix A: Administration Officers

Alphabetical listing of the Air Force administration officers who provided informal interviews and pretests of the survey questionnaire:

Winifred Daubard, Capt

Albert Dunn, Capt

Deborah Fairchild, Capt (Major select)

Mark Fairchild, 1st Lt

Thomas Falkowski, 1st Lt

Kelly Fulcher, 1st Lt

John Kane, Capt

Tamara Mackenthun, Capt

Jeff Nelson, 1st Lt

Chris Norcia, 1st Lt

APPENDIX B

LSG (Capt Coleman) 31 May 1988

Computer Needs Assessment Survey. USAF Survey Control Number 88-62, expires 31 Aug 88.

Survey Participant

1. Please take 10 or 15 minutes to complete the attached questionnaire and return it in the enclosed envelope by 30 June 1988.

2. The survey measures the computer knowledge levels and perceived training needs of Air Force administration officers. The survey's primary objectives are to determine if administration officers have the required computer skills to complete job tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency. The data we gather will become part of an AFIT research project and may influence the planning for specific computer training requirements to be added to administrative technical training courses.

3. Your responses will be combined with other respondents and will not be attributed to you personally. Although your participation is completely voluntary, we would certainly appreciate your help. If you have any questions, please contact Capt Cheryl Coleman at AUTOVON 785-6569. Thank you for your support.

JAMES T. LINDSEY, Lt Col, USAF
Head, Department of Communications
and Organizational Sciences
School of Systems and Logistics

2 Atch
1. Survey
2. Return Envelope

COMPUTER LITERACY NEEDS ASSESSMENT

Part I. This part asks for background information. Questions will provide current data on demographic information about administrative officers.

1. What is your age group?

    1. 20-30
    2. 31-40
    3. Over 40

2. What is your current rank?

    1. 2d Lt
    2. 1st Lt
    3. Capt
    4. Maj
    5. Lt Col
    6. Col

3. What is your sex?

    1. Female
    2. Male

4. What is your highest educational level?

    1. Bachelor's degree
    2. Bachelor's degree plus
    3. Master's degree
    4. Master's degree plus
    5. Doctoral degree

5. How many years active military service do you have?

    1. Less than 3 years
    2. 3 years, but less than 6
    3. 6 years, but less than 9
    4. 9 years, but less than 12
    5. 12 years, but less than 15
    6. 15 years or more

6. What is your duty AFSC?

    1. 7024
    2. 7034
    3. 7016
    4. 7046
    5. Other

7. How many years have you been in your current job?

1. Less than 1 year
2. 1 year but less than 2
3. 2 years but less than 3
4. 3 years but less than 4
5. 4 years or more

Part II. Computer Background/Experience. Please read through the following list of statements that may relate to your background and experience with computers.

Answer with a 1 if the statement is true about you.
Answer with a 2 if the statement is false about you.

8. I have never used a microcomputer in my life.

9. I own and use a computer in my home.

10. I use a computer on my job.

11. I have had formal training in at least one software application.

12. I am computer literate.

13. I have had formal training in at least one course in information management.

14. I have had formal training in at least one course in data processing.

15. I am assigned to a position that requires a C prefix as defined in AFR 36-1.

16. The computer knowledge that I have is self-taught.

17. I have had training in systems analysis and design.

18. I acquired computer skills before entering the Air Force.

19. I acquired computer skills after entering the Air Force.

20. I acquired computer skills through Air Force training.

Part III. The following questions concern your opinions about the introduction of desktop, microcomputers or computer systems to your specific work environment.

For each item, use the following scale to indicate the level of your agreement or disagreement with each statement.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	2	3	4	5

21. I consider myself computer literate.

22. Computer literacy is important in my present job.

23. Computer literacy is more important in my present job than in past assignments.

24. I am comfortable using a computer.

25. I have used the computer to improve the efficiency of administrative functions that I manage.

26. I could perform some job tasks more effectively if I had additional computer training.

27. Computer knowledge is important for managing automated functions.

28. I would be better able to manage automated administration functions if I had more computer knowledge.

29. Automation of administrative functions has increased the amount of computer knowledge that I need to do my job well.

30. In the future, computer literacy will become more important to administration officers.

31. I have job demands that I cannot effectively meet because I do not have an appropriate level of computer knowledge.

32. On-the-job computer training is more beneficial than classroom training.

33. Formal computer training should be included in administrative technical training courses.

Part IV. Below is a list of computer terms. Some refer to concepts, some to specific kinds of equipment, and some to programming. Read through the list and and use the scale to indicate your knowledge about each item.

1 = I am not familiar with this 6 = I know quite a bit about this

TERM OR CONCEPT		WHAT I KNOW ABOUT IT					
34.	Microcomputer	1	2	3	4	5	6
35.	Mainframe computer	1	2	3	4	5	6
36.	Floppy diskette	1	2	3	4	5	6
37.	Disk drive	1	2	3	4	5	6
38.	Bit	1	2	3	4	5	6
39.	Byte	1	2	3	4	5	6
40.	Baud rate	1	2	3	4	5	6
41.	Operating systems	1	2	3	4	5	6
42.	Hardware	1	2	3	4	5	6
43.	Software	1	2	3	4	5	6
44.	Word processing	1	2	3	4	5	6
45.	Electronic spreadsheet	1	2	3	4	5	6
46.	Database	1	2	3	4	5	6
47.	Interface	1	2	3	4	5	6
48.	Random access memory (RAM)	1	2	3	4	5	6
49.	Read only memory (ROM)	1	2	3	4	5	6
50.	Local Area Network (LAN)	1	2	3	4	5	6
51.	Program language	1	2	3	4	5	6
52.	System analysis	1	2	3	4	5	6
53.	System design	1	2	3	4	5	6

Part V. Below is a list of computer terms. Some refer to concepts, some to specific kinds of equipment, and some to programming. Read through the list and and use the scale to indicate the <u>importance</u> of each item to your job.

1 = This is very unimportant to my job

6 = This is very important to my job

TERM OR CONCEPT	IMPORTANCE TO MY JOB					
54. Microcomputer	1	2	3	4	5	6
55. Mainframe computer	1	2	3	4	5	6
56. Floppy diskette	1	2	3	4	5	6
57. Disk drive	1	2	3	4	5	6
58. Bit	1	2	3	4	5	6
59. Byte	1	2	3	4	5	6
60. Baud rate	1	2	3	4	5	6
61. Operating systems	1	2	3	4	5	6
62. Hardware	1	2	3	4	5	6
63. Software	1	2	3	4	5	6
64. Word processing	1	2	3	4	5	6
65. Electronic spreadsheet	1	2	3	4	5	6
66. Database	1	2	3	4	5	6
67. Interface	1	2	3	4	5	6
68. Random access memory (RAM)	1	2	3	4	5	6
69. Read only memory (ROM)	1	2	3	4	5	6
70. Local Area Network (LAN)	1	2	3	4	5	6
71. Program language	1	2	3	4	5	6
72. System analysis	1	2	3	4	5	6
73. System design	1	2	3	4	5	6

PART VI. The following questions concern your preferences in learning a skill. Use the scale below to indicate your preferences.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	2	3	4	5

74. I find I learn best when I work alone.

75. I find that working in a group helps because I see other people's views.

76. Learning by doing has always been a good way for me to learn.

77. I prefer very specific instructions to general guidelines and concepts.

78. I like to know a lot about the principles behind a thing before I try putting it into practice.

79. I have no use for the theories and principles behind a thing. I just want to know how to use it to get what I want from it.

Part VII. Open-ended question. Please respond to the question in the space below.

80. Please comment on any concern you have about computer literacy that has not been covered in this questionnaire.

Thank you for your help. Please return this questionnaire and your answer sheet in the enclosed envelope to Capt Cheryl Coleman, AFIT/LS, WPAFB OH 45433-6503.

THANK YOU FOR YOUR COOPERATION

APPENDIX C

Table XXVII

Complete Computer Background and Experience

Question	Frequency	Percentage
Never used a microcomputer		
Yes	35	13.7
No	220	86.3
	255	100.0
Own and use a computer		
Yes	97	38.0
No	158	62.0
	255	100.0
Use computer on the job		
Yes	162	63.5
No	93	36.5
	255	100.0
Formal training in at least one software package		
Yes	111	43.5
No	144	56.5
	255	100.0
Computer literate		
Yes	130	51.0
No	125	49.0
	255	100.0

Table XXVII (Cont)

Question	Frequency	Percentage
Formal training in information management		
Yes	100	39.2
No	155	60.8
	255	100.0
Formal training in data processing		
Yes	76	29.8
No	179	70.2
	255	100.0
Duty position requires C prefix		
Yes	11	4.3
No	244	95.7
	255	100.0
Computer knowledge is self-taught		
Yes	152	59.6
No	103	40.4
	255	100.0
Training in systems analysis and design		
Yes	35	13.7
No	220	86.3
	255	100.0

Table XXVII (Cont)

Question	Frequency	Percentage
Acquired computer skills prior to Air Force		
Yes	66	25.9
No	189	74.1
	255	100.0
Acquired computer skills after entering Air Force		
Yes	182	71.4
No	73	28.6
	255	100.0
Acquired computer skills through Air Force training		
Yes	66	25.9
No	189	74.1
	255	100.0

Table XXVIII

Opinions about Microcomputer in Work Environment

Question	Frequency	Percentage
Consider self computer literate		
1	46	18.0
2	60	23.5
3	31	12.2
4	93	36.5
5	25	9.8
	255	100.0
Computer literacy important in job		
1	16	6.3
2	48	18.8
3	47	18.4
4	94	36.9
5	50	19.6
	255	100.0
Computer literacy more important in present job		
1	24	9.4
2	56	22.0
3	77	23.9
4	61	23.9
5	37	14.5
	255	100.0
Comfortable using a computer		
1	27	10.6
2	48	18.8
3	39	15.3
4	86	33.7
5	55	21.6
	255	100.0

Table XXVIII (Cont)

Question	Frequency	Percentage
Used computer to improve administrative functions		
1	22	8.6
2	31	12.2
3	27	10.6
4	106	41.6
5	69	27.1
	255	100.0
More training would improve effectiveness		
1	6	2.4
2	12	4.7
3	19	7.5
4	92	36.1
5	126	49.3
	255	100.0
Computer knowledge is important		
1	4	1.6
2	6	2.4
3	21	8.2
4	109	42.7
5	115	45.0
	255	100.0
More knowledge would improve management capability		
1	8	3.1
2	8	3.1
3	28	11.0
4	98	38.4
5	113	44.3
	255	100.0

Table XXVIII (Cont)

Question	Frequency	Percentage
Automation has increased computer knowledge needed		
1	7	2.7
2	19	7.5
3	48	18.8
4	101	39.6
5	80	31.4
	255	100.0
Computer literacy will become more important		
1	3	1.2
2	5	2.0
3	4	1.6
4	83	32.5
5	160	62.7
	255	100.0
Cannot meet job demands with present computer knowledge		
1	36	14.1
2	113	44.3
3	42	16.5
4	33	12.9
5	31	12.2
	255	100.0

Table XXVIII (Cont)

Question	Frequency	Percentage
OJT training better than classroom		
1	13	5.1
2	55	21.6
3	81	31.8
4	80	31.4
5	26	10.2
	255	100.0
Include computer training in technical training courses		
1	7	2.7
2	9	3.5
3	15	5.9
4	99	38.8
5	125	49.0
	255	100.0

Table XXIX

Preferences in Learning a Skill

Question	Frequency	Percentage
Learn best alone		
1	18	7.1
2	85	33.3
3	79	31.0
4	51	20.0
5	22	8.6
	255	100.0
Prefer Working in Group		
1	5	2.0
2	23	9.0
3	54	21.2
4	128	50.2
5	45	17.6
	255	100.0
Prefer Learning by Doing		
1	2	.8
2	2	.8
3	13	5.1
4	111	43.5
5	127	49.8
	255	100.0
Prefer Specific Instructions to General Guidelines		
1	7	2.7
2	23	9.0
3	79	31.0
4	90	35.3
5	56	22.0
	255	100.0

Table XXIX (Cont)

Question	Frequency	Percentage
Like to Know Principles		
1	7	2.7
2	37	14.5
3	71	27.8
4	101	39.6
5	39	15.4
	255	100.0
Do not Need Theories		
1	57	22.4
2	95	37.2
3	60	23.5
4	29	11.4
5	14	5.5
	255	100.0

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The purpose of this study was to determine whether Air Force administration officers have the required computer skills to effectively perform administrative tasks, and to identify specific areas of training those administration officers perceive as necessary to improve computer competency. Six investigative questions were posed: (1) Does the administration officer have job tasks that require computer skills? If so, how well can the officer perform the tasks? (2) What computer competency skills are required? How competent are current administration officers with each skill? (3) Have computer training courses been necessary to perform job related tasks? If so, what formal or informal training has the officer completed? (4) How has the automation of administrative functions changed the level of computer competency that administration officers need? (5) How does the level of computer literacy needed on the present job compare with the level needed in past jobs or assignments? (6) What computer applications and functions are most used or managed by administration officers?

This study found that administration officers have job tasks which require computer skills, but do not perceive themselves as computer literate. Administration officers perceive they need both (1) general computer and systems knowledge necessary for being an effective manager of automated systems, and (2) knowledge about microcomputers, associated hardware components, and standard software applications.

This study recommended three types of training to improve computer competency among Air Force administration officers: (1) Include computer orientation as part of the Administration Officer Course for all officers entering the career field, (2) Train directors of administration in management of automated systems, with specific information on existing automated administration programs, and (3) Make computer orientation courses available to all administration officers through MAJCOM sponsored programs with the focus on general computer knowledge and applications and hardware specific to each command.