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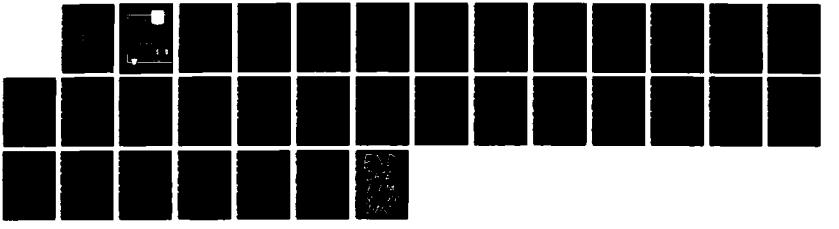

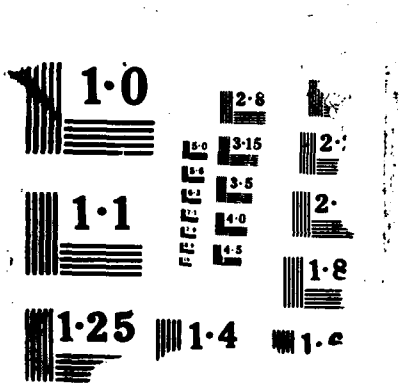
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STUDY PROJECT

DEVELOPMENT OF THE AUTOMATION REQUIREMENTS FOR THE AWC STUDENTS AND GRADUATES

BY

LIEUTENANT COLONEL DAVID C. ALLBEE

16 MAY 1988

U.S. ARMY WAR COLLEGE, CARLISLE BARRACKS, PA 17013-5050

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The U.S. Army has had computers in its inventory since 1946 when the Electronic Numerical Integrator and Calculator (ENIAC) was delivered to the U.S. Army Ordnance Department. This military studies project looks at the requirements for the computer literacy of the senior officers, while reflecting on the training received by the junior officers. A search for the requirements for the senior officers is based upon the Professional Development of Officers Study (PDOS) and how these requirements will match the future of the Army. Lastly, the AWC computer education system is looked at to see if it meets

the needs of the current officers.

USAWC MILITARY STUDIES PROGRAM PAPER

Development of the Automation Requirements for the AWC Students and Graduates

An Individual Study Intended for Publication

by

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ABSTRACT

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The U.S. Army has had computers in its inventory since 1946 when the Electronic Numerical Integrator and Calculator (ENIAC) was delivered to the U.S. Army Ordnance Department. This military studies project looks at the requirements for the computer literacy of the senior officers, while reflecting on the training received by the junior officers. A search for the requirements for the senior officers is based upon the Professional Development of Officers Study (PDOS) and how these requirements will match the future of the Army. Lastly, the AWC computer education system is looked at to see if it meets the needs of the current officers.

While the enemy attacks across the contested borders in the year 2000, the defense is initiated by the ground sensors transmitting their information to the battle center with information of the enemy incursion. The computer activates the orbiting imaging and targeting devices and directs their interrogation of the attackers. The holistic computers are now identifying the enemy attack and are selecting the best weapons to use in defeating the attack. The computers direct the launching of unmanned aircraft. These information gathering devices fly above the battle area and send the additional data via satellite links to the theater commander's battlefield computer center. The battle has started in the twinkle of an eye and the forces are alerted and courses of action have been identified and selected. Now it is time to return the control of the battlefield to the commander. The terminal in the commander's vehicle alerts the commander to the attack and now the slow down begins. The time to brief the commander takes an interminable time compared with the time for the computer to recover the data from the myriad of sensors from the region. The longer the time necessary to brief the commander, the more data available and the longer the briefing must be. Can the commander keep up with the output of the computer? Is this science fiction? No! With the current satellite imaging and communications techniques, the Aquila RPV and the next generation of patrol drones not requiring an operator, the ground sensor devices, JSTARS with the targeting and tracking capabilities, and

the Maneuver Control System's Tactical Computer Terminal the 21st century is here now! The holistic computer utilizing artificial intelligence has been worked on for 20 years. Are we ready? Are we training our future commanders to handle this new wave of information? This Military Studies Project will look at the current requirements for the senior officer's training in the field of automation and to compare this with the current situation in the U.S. Army.

The time of the Civil War commander standing on the hill and surveying his battlefield to acquire his information first hand is over. True, it has been over for some time but the size of the battlefield continues to grow with the introduction of the AirLand Battle concepts. The choice of seeing the battlefield first hand is gone. How is the commander to get the needed information? The commander in Europe will have the use of the Joint Surveillance and Target Attack Radar System (JSTARS) to see deep into the AirLand Battlefield. As well as seeing deep, the system will allow the commander to see the battlefield area through the use of graphics depiction on the terminal at the corps and division headquarters as well as to track and attack targets.[1] The attack could be by the use of the Army Tactical Missile System (ATACMS), under development, or the Lance missile system in giving the corps commander the INITIATIVE to fire the lance without assistance, DEPTH in the long range of the Lance missile, AGILITY by repositioning the Lance system by rapid movements, and SYNCHRONIZATION due to the total control that he

has (unlike the air interdiction assets) in shifting fires to the necessary interdiction targets that will be available for only fleeting moments.[2] These are the necessary features of the AirLand Battle doctrine; but, they will only be available to the commander due to the computer interface and the ability of the commander to utilize the automated information.

In the past, the commander has always had the help of the technician to be his interface with the computer world. The commander would ask and someone else would find the answer. This was during the time when there were few computers in the Army. Information Management is a command responsibility. The more senior the officer, the larger the responsibility due to the larger the size of the command.

The commander has been getting help with the inclusion of the new computer technologies into the unit by the acquisition of many new computer systems. Within the last 2 years, over 120,000 computers have been added to the force.[3] Now the commander has a terminal device in his vehicle, in his headquarters, and even on his desk. Computers have been with the Army for over forty years. In 1985 when the FORSCOM and ISC did an inventory of the automation equipment, only 48 or 49 percent of the computer equipment was even on the property book.[4] This may not be bad for the concept of automation since the equipment was at least being purchased. Unfortunately, 26 percent of the equipment was not even in use. Some of the devices were still in boxes while others were just sitting on desks not hooked up.[5] Mr. Craven,

the Information Mission Area Reorganization Coordinator, felt that this same condition existed in the other MACOMs. This situation arose in many units due to the desires of one individual to advance their unit into the age of automation by buying a system. When that person left, the system sat unused by the next replacement. In most cases the commander was ambivalent to the implementation and was not an active supporter of the new systems. Was this ambivalence caused by the lack of the computer literacy of the senior officers? Perhaps the best answer that can be put forth is that the commanders arose through an organization that did not have the computer which is now being thrust upon the Army at all levels. The commander must understand the implementation of the computer similar to the implementation of the new weapon systems that are being fielded today. In each case the commander does not have the personal experience of utilizing this system during his entire military career. This lack of growing up with the system does not stop the implementation of the weapon system and should not stop the implementation of the new technologies in the information systems to increase the effectiveness of the the command, control and intelligence.

How does the Army get a handle on the information systems? The result of the study by General Paige, Commanding General, U.S. Army Information Systems Command (USAISC), was the creation of the Information Mission Area (IMA). With the approval of the Chief of Staff, the IMA was created and the assigned proponent

was the Commandant, U.S. Army Signal School.[6] The IMA is defined as including the subdisciplines of automation, communications, records management, publications and printing, visual information activities and supporting activities, services, and facilities. Office automation is an inherent part of automation and is not treated separately.[7] LTG D. Rogers has been appointed as the Director Information Systems for Command, Control, Communications, and Computers (DISC4) and has the general staff responsibility for the IMA.[8] At each of the MACOMs the principle staff officer for information management is usually designated the Deputy Chief of Staff for Information Management (DCSIM). At Army installations and comparable levels the principle staff officer is designated the Director of Information Management (DOIM).[9] These staffs are not only managers of technologies and supply services and support, but must also manage information. It must be understood that these staffs are not responsible for management of all of the information; but, the functional staffs are responsible for the management of the information for their area of responsibility.

Now that the staff organizations are set, what about the commander? This is all well and good; but, the support of the staffs must come from the commander as AR 25-1 states that information management is a command responsibility. The current Information Mission Area "mission is to influence the battle by developing a comprehensive, flexible and interoperable C^2 system that totally shares resources and information."[10] This sharing

of information is necessary for the successful command and control (C^2) by the commander of his forces. "The overall information management goal is to design, to build and to field C2 and support systems so the Army can operate the same way in peace and war. This will assure maximum readiness for the transition from peace to war."[11] This goal is the basis for the tasking to the Army as a whole for the development, integration and utilization of the computer systems. The basis of Army training has been that the Army must practice in peace the same way that it will fight during wartime. The same training philosophy should be valid for the commander in the utilization of these advanced computer technologies. The commander's use of the computer in the peacetime work place will also enhance his use of the computer during wartime. Many of the information systems are designed around the concept that the same reporting system will be used in the garrison as are used in the combat arena. For this is the point of the symbiosis of man and machine, it is a characteristic that distinguishes command and control systems from other military resources.[12] Dr. Martin, Deputy Under Secretary of Defense for Research and Advanced Technology, has identified this effective integration of multiple disciplines; graphics, pattern recognition, voice recognition, touch, sensors, controllers and the expert system; as the major challenge to the effective development of the Artificial Intelligence (AI) research effort to assist the commander in the field.[13] The goal is not to just get information faster, it is

to allow the commander and his staff to use the military decision making process quickly enough to operate within the enemy's decision cycle.[14] Deciding to attack an enemy force after it has left the area is of no use. The decision to attack must be made within the constrained window of opportunity from the detection of the enemy force and prior to the enemy force escaping.

The commanders and the staffs are expected to execute the new SIGMA Star notion of LTG Rogers which incorporates the 5 points of the star: maneuver, air defense artillery, fire support, intelligence/electronic warfare, and the combat service support.[15] The commander's position is one of the most important. He is the one to make and to break the systems. (Remember the 26 percent of the computer equipment that was not being used at all.) The commander's role has changed, just as he cannot see the entire battle field by standing on top of a hill, his relationship with his troops has changed. Morris Janowitz stated that the need for a heroic fighter persists and there is a requirement for individual performance in combat.[16] But he continued to state that "When military discipline was based on domination, officers had to demonstrate that they were different from the men they commanded. Today, leaders must continuously demonstrate their competence and technical ability, in order that they may command without resort to arbitrary and ultimate sanctions."[17] Just as no commander would give up the advanced capabilities of a new weapon system, the commander cannot give up the capabilities that are available through the use of the

computer technologies. The question is: "Has the Army prepared the new commander of today for the technological breakthroughs?" "There is nothing in thousands of years of human history to prepare ourselves for the incredible changes in our lives and our lifestyles that computers and communications technology will generate"[18] in the next few years. The problem is one of the time of birth for the microcomputer and the man. Those who were born and grow up with the computer "will tend to embrace the new technology rather than fear it."[19] LTG Charles W. Bagnal, as the study director for the Professional Development of Officers Study (PDOS), identified that one of the pressing goals was to make the officers comfortable with the routine uses of the new electronic technologies.[20] It is important that the officers be taught the capability of the new technologies in order to increase their human capabilities, for example to allow the commander to make decisions faster. This technology must be a natural extension of the officer and the only way to do this is to make it a natural extension of the officer's environment in a peacetime or wartime setting.[21] I feel that the goal is for our commanders and senior officers to be computer literate and not necessarily an expert on the utilization of any single application. The charter for the Army is for the continued development of each officer through education and training. It is also the tasking to each officer for their personal development as a professional Army officer to become familiar with the routine uses of the new electronic technologies. As will be seen, this is a real challenge to the

officers at the different levels as the computers all being brought into the Army at all levels simultaneously. This study is the only written requirement for the senior officer's development with the technology of the computer literacy and is the basis for the officers' competency to support Gen Rogers SIGMA star concepts.

Computer literacy is to be construed to be the knowledge of what a computer is and the function it may perform. The need is for the commander and his staff to be able to intelligently apply computer related concepts and capabilities to enhance their job in order to amplify their learned knowledge and skills.[22] It is not necessary for the officer to know the intimacies of electronics to be able to use a radio nor the computer language that controls the computer systems to utilize the computer to gain an advantage. Unfortunately, many of the senior officers that I have worked with are afraid to even touch the computer keyboard. These same individuals will not even hesitate to fire the new 9mm individual weapon. While it is unlikely that the senior commander will have to use that personal sidearm in war, it is obvious that computer systems will be used in the decisions of the next war. The computer is a new technology and is not perceived by many of the officers to have a place on the battlefield. The question becomes: "Are they (the officers) preparing themselves for the new modern integrated battlefield?" The question can be phrased differently as: "Is the Army and are the individual officers meeting the requirements for their

professional development as stated in the PDOS?" For the peacetime setting, the commander must make use of the emerging capabilities of Computer Based Instruction (CBI) in that it will provide a standardization of instruction and will be available to individuals separate from the training facility.[23] The Coast Guard is sending CBI instruction to their individuals aboard ships to continue their education. LTG Bagnal's study felt that this concept should be expanded by the use of Computer Communication Based Instruction (CCBI) where this instruction could be sent over a communication line to the terminal. This also opens up the possibility of interactive instruction using many individuals in different areas to solve or work the same problem or exercise. This training increases the possibility of "assisting commanders, staffs, and key decision makers in making sound decisions in a high-stress, fast-paced, rapidly-changing, complex environment...to increase the tempo of decision making the combat and peacetime decision making cycle."[24] Here again is the concept of using the computer in peacetime to increase the wartime decision making process and allowing the commander to make decisions to get inside the enemy's decision cycle. "The primary role of the colonel is that of an integrator - one who can successfully manage many systems and orchestrate those systems in such a way as to achieve a stated purpose."[25] Perhaps the use of the computer is considered to be someting new to the Army: it is not! The Army has been in the computer business since 1946 with the acquisition of the thirty ton Electronic

Numerical Integrator and Calculator (ENIAC).[26] This computer was very large and required the many operators to program it by the setting switches, connecting wires, and disconnecting wires. This was not a very transportable computer. But since 1965, the third generation computers have used integrated circuits which have allowed the size and cost of the machines to plummet.[27] The senior officers have grown up with computers; but, not with the proliferation of the personal computers that has occured within the last few years. This is the difference in use of the computer today. The rapid influx of the smaller computer systems to the Army and their added advantage to the commander has made it a pressing current requirement to incorporate this new technology across the entire force similar to the incorporation of the new 9mm pistol across the entire force in a short time. Can the senior officers be the integrators of the new technologies across the board? How do we train to integrate the computer into the senior officer's life? One must take a quick look at the total Army officer picture.

First a look at the junior officers education background in computers. Most of the grade schools now use computers in the classrooms for recreation (games) and for some CBI in the fields of mathematics and spelling. High schools are utilizing the computers in CBI for science and in learning English. Many schools now teach keyboarding and not just typing. The difference is that computers and their operating systems are used rather than as just a typewriter. Many colleges are starting to

require a course in computer operations. Stanford Business School, University of Pennsylvania Wharton School, Harvard, and others are beginning to actively apply computer use in the classroom and for study outside the classroom. Soon the "ability to use a computer will be no different than being able to apply the 3R's."[28] The junior officers are arriving with some knowledge and skill in the use of the computer. This knowledge and expertise of the junior officer will increase within the next few years as the use the computer increases in their education.

Presently there is no requirement for the incoming officers from OCS or ROTC to take a computer basic skill course or to have every used a computer. The exception is the computer science course required of each cadet at the United States Military Academy regardless of the cadet's chosen discipline.[29] This course includes initial programming instruction in PASCAL and telecommunications techniques. Each cadet has their own personal computer and each academic department is actively engaged in developing software that can be used in the cadet's room. Since each computer is tied into a local area network, this software may be downloaded from the cadet's room. After two years of daily computer use, the cadets have become very proficient in the use of the computer and have accepted it as easily as using a pencil. Each university or academy offers many courses in computer science, including programming in each language from the low level machine or assembly languages to the higher level languages of FORTRAN and PASCAL. Once in the Army, many of the

officer basic courses (OBC) and the officer advanced courses (OAC) are beginning to apply the use of computers in their instruction. The junior officers of today and the next few years are the officers that are growing up with the computer and will in general feel most comfortable with its use.

The aim of the field grade development period is "to develop a field grade officer who possesses the body of knowledge and conceptual skills necessary to perform successfully in field grade command positions and in staff positions at all levels of the Army."[30] When the officer reaches the Command and General Staff Officers Course, he is expected to be able to utilize the computer. The officer uses the CORVUS computer in the section room for course study and for the preparation of the orders and plans for each exercise. Many of the scenarios require the use of the computer to calculate data, such as the closure time for a force into a theater of operation or for the intratheater movement of the force. The use of artificial intelligence expert systems will be added to curriculum when developed for "without an effective system (of education), technological breakthrough will count for naught because we will not know how to direct it."[31] During the elective portion of the course, there are opportunities for the officer to take classes in the basic computer operations, programming in the languages of BASIC, FORTRAN, and COBOL, as well as taking classes that require the use of the computer, such as the statistics analysis courses and the mobilization course. For next year, the CORVUS computers are

all being replaced with the DOD standard Heath-Zenith 248 computer utilizing the MS-DOS operating system. Due to the influx of the new machines to the U.S. Army and the need for knowledge of the current systems, this change at Ft. Leavenworth will have great benefits in a very short time. The use of the standard machines will mean that the students will be able to take the knowledge as well as some of the computer programs with them when they graduate and return to their Army units. These officers will then become the mentors for the next generation of officers going to the CGSOC, which will lessen the load of basic computer instruction and will allow more advanced use of the computer in the CGSOC instruction. These officers will also be able to apply the capabilites of the computer to their new units, increasing the level of utilization of the computer in U.S. Army.

There is another group of officers that stay at Fort Leavenworth for a second year, these are assigned to the Advanced Military Studies Program (AMSP). This program has assigned a computer to each student for his use during the year. The basis of the course is to emphasize the integration of art and science of war at the operational level, in joint and combined operations.[32] While this group is limited to only 48 each year, it is important to realize the importance of the use of the computer as a tool for their education. They are expected to use the computer in many ways to include teleconferencing. Many become active users of the U.S. Army Forum. This is a network that is open to a voluntary group of American soldiers and

citizens who contribute useful insights, perspectives and approaches to develop and compare issues facing the U.S. Army. This network is composed of at least fifty subnets that work single topic issues.[33] Any member may sign into the net at any time and correspond with the other members regarding a personal question or a topic issue.

As can be seen the state of the education of the various officers in the Army regarding their computer literacy and training is varied. How then is the senior officer to be the focal point and exercise the command responsibility for the imformation management? Most of the senior officers are receiving their education at the office by the on the job training technique. Arriving at the office the first day, the officer may be faced with a new experience of a computer being part of the desk. Most of the officers at the Pentagon have a computer on their desk and are expected to utilize it on a daily basis. The individual now is faced with the personal development of the professional requirements that LTG Bagnal's study set forth. The next formal education for the officer is centered on the U.S. Army War College.

At the U.S. Army War College, the officers continue to utilize computers in three exercises; TACOPS II (a Theater and Corps Operations and Planning Simulation II), G-FAST (Global Force Assessment Deployment Simulation), and Tin Man (a mobilization exercise). These exercises are utilized to demonstrate the relevance of war games to the professional

development of the Army officer and the use of war gaming activities as enhancements to the curriculum of the U.S. Army War College.[34] While at the same time, the exercises demonstrate the capability of the computer to facilitate the command decision process. To do the calculation by hand for the mobilization exercise would be tedious and time constrained. By the utilization of the computer, the groups are able to evaluate more possibilities and arrive at a solution that has been optimized in a shorter time than by hand calculation. This same tecnology is stressed in many courses as the means by which operational and strategic decisions will be made in the shortest possible time by the senior commanders. The U.S. Army War College computer system utilizes approximately 65 WYSE terminals networked and operating on the Xenix operating system. The system allows the individual user to utilize the Q-Office set of programs to include the word processor, spreadsheet, and communications. The capabilities are similar to those in most of the larger staff offices and support the goals expressed in the PDOS. The Army War College (AWC) curriculum has been designed to serve as a catalyst to assist the students in the transition to a higher professional level and frame of reference.[35]

The AWC must assist in the preparation of the officers to be the mentors for the high level staffs and organizations to which they will be assigned. With the terminals available, the AWC does demonstrate the wargame applications. The Executive Skills Center presents a series of classes on word processing,

spreadsheets, and database management. Selected automation and Army IMA topics are also presented in an overview session that include desktop publishing, graphics, communication, and artificial intelligence.[36] These courses are designed to make the AWC graduate more knowledgeable and computer literate. These courses are voluntary and the enrollment changes as the officers receive their orders to high level staffs in the joint and combined forces area and are told that they will have a computer and will be expected to utilize it.

Many of the staff officers at the higher levels are utilizing the computers to conduct their business on a day to day basis. TRADOC headquarters allows DF's to be sent by electronic means rather than requiring a printed copy. The goal in the new TRADOC office building is the development of the paperless office. This will force each of the officers to actively use the computer for most of the daily functions. Most members of the staff utilize the computer to check calendars and to send and receive mail from other staff members. A similar situation occurs in the Pentagon where members transfer files and information by telecommunication or by removable media, i.e. a floppy disk. These staff members are also utilizing their computers to develop and present briefings utilizing the graphics capabilities of the computer. Creating the presentation on a computer allows the individual to quickly modify or amplify the screens used in the presentation, no more waiting for the media support branch to create the slides in days or weeks. The Coast

Guard headquarters is utilizing most of the same techniques. The action officers are preparing their reports and send them around for comment on a floppy disk. This is not to imply that the officers are now secretaries. The officers are creating the action responses and getting the approvals. Once approved, the action report is then given on floppy disk, or by a telecommunications means, to the secretary who does the professional editing and formatting of the final document. At USMA, the Dean's senior staff members are tasking and setting suspenses for the academic departments through the use of the local area network that ties all the computers together. Individual communications are available between any two individuals or among the members of a group. The group may be predetermined or may be created at the time of the message. Not only is the staff utilizing the computer, but the instructors are now able to talk directly with their individual cadets or the cadet's supervisor if there is a problem or a desire to give some praise. The capability of using the telecommunications has relieved the stress of the phone number being busy for hours at a time. Similar to the Army Forum, messages may be left for others and they may answer at their leisure. This use of the computer for communications is not just limited to the junior officers as each head of the department has a computer and is able to communicate with the other members of the Academic Board.

The AWC's course of action for assisting the officers in becoming computer literate is working. The institutional

requirements for the use of the computer allow the officers that have not used a computer before to see the power and application of the computer. At the same time the personally motivated officer may utilize the courses and the equipment to further his professional development. Is there room for improvement in assisting these senior officers to meet the PDOS goals for computer literacy? A survey of the 280 students was conducted with 201 officers responding. Of these officers, 143 owned computers (51%). This is a high number than I expected and the percent should continue to grow each year. The ownership of computers was broken into the following general types:

Operating System	Percent
MSDOS	41
Apple DOS	27
Commodore	12
MacIntosh	10
Others	10

This is a fairly good mix of the major systems, it would be expected that the officers with elementary age children would have an Apple as that is the computer generally used in the grade schools. The high number of MSDOS machines is meaningful as this relates to the ease of portability of the officers work from the standard office machine (Heath-Zenith 248) to the home computer. To evaluate the individual education capabilites of the AWC to the individual needs, the questionnaire inquired about the need for more classes. Of those responding, 95 (47%) felt that more

instruction should be provided by the AWC. This feeling is exemplified in that only 60 (30%) utilized the available machines in the seminar room, many citing the lack of training in the use of the computer system. This should NOT be construed as an indictment of the AWC system! The question regarding the classes was the last question of the survey. To get an appreciation of the true feeling of the students, the first question of the survey asked about their use of the offered classes. The survey was constructed such that these two questions were separated by the greatest distance to preclude the student rationalizing their answer to either question. With the realization that the additional classes were optional, only 34 (17%) stated that they had made use of the numerous classes that were offered by the AWC. The paradox is that the officers want more instruction but are not willing to sign up for the optional classes.

Can the AWC give the senior officer the capability to utilize the system to a greater extent and enhance their professional development? Knowing that the officers that attend the AWC are personality type A's may assist in the education process. If a user's guide were given to each officer during the introductory class, the officer would have something to refer to for basic use of the system. These are officers that are self-starting and able to follow directions when needed. When they desire to use the computer system, they want to use it now and not wait two weeks for a class. Therefore, a small manual may satisfy their initial desire while they wait for the class. The

benefits would be the increased use of the computer technologies and capabilities leading to an increased professional officer development and keeping the officer's interest until the class is taught. A proposed outline could be:

I. Introduction and explanation of the system in use at the AWC.

II. A table of the classes that will be offered during the year or at least for the first two course blocks.

III. A basic description of the keyboard layout with emphasis on the special keys utilized in the Q-Office system.

IV. A short lesson in the basics of word processing using Q-One. This must include the difference in the modes, inserting and deleting text, spell checking, and the basic formatting options.

V. A short lesson in the basics of the spreadsheet MultiPlan.

VI. A short lesson in the basics of the database File-It.

VII. A lesson in the capability of the telecommunications, utilizing the modems and how to leave and receive messages.

VIII. Finally a discussion of the utilities that are available on the

system. The prime one that comes to mind is the capability for

reading and writing MSDOS diskettes.

This user's guide should not be a major work of hundreds of pages, but should be of about 20 pages. The user's guide for the USMA cadets is 24 pages. Additional guides for the cadets are available for the more advanced user, as are the entire set of manuals. If this USAWC user's guide is published, the manuals for each of the applications should be available in the seminar room and in the Executive Skills Center for reference by the computer user. This user's guide would support the PDOS requirement for the senior officer to gain ease of use of telecommunications and enhance the individual's overall computer literacy. This of course assumes that the individuals will use the guide to increase their use of the USAWC computer system.

If the officers that had MS-DOS machines knew that they could bring their data or manuscripts into the seminar room computer, perhaps more would have used the system. Additionally, only 26 (13%) of the officers utilized modems. By the use of the seminar message system and the AWC modems, the AWC can assist in the education of the officers such that they will be more at ease with the telecommunications that they will be expected to use in the future.

As has been seen the PDOS has given the senior officers the responsibility to become comfortable with the uses of the

computer technology. The sudden influx of the microcomputers has forced each unit to evaluate and to use the computer technology while the commander has been designated as the focal point for the information management. While forcing the units to evaluate the use of the computer, the new computers have allowed the officers the necessary equipment to become familiar with this new technology. Each of the service schools are facilitating the professional development of the officers by using the computers in the courses, by allowing the use of the computer systems and by offering individual instruction courses that will teach the officers the basics of the use of the computer and its applications. This utilization of the computer in the school curriculum must be continued and allow expanded utilization by the students. It must be realized that most of the learning will be on an individual basis for each officer to meet the required educational levels for their professional development. For it is the individual officers that must realize that our profession requires that they develop the necessary skills in the use of the computer as a tool to be effective role models and enhance their leadership capability. This lack of education and acceptance of the computer by the current senior officers will disappear within five to eight years as the middle officers, that are experiencing the inclusion of the computer into the organizations, are promoted to the rank of colonel.

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35. Bagnal, p. EE-1.

36. R. J. Preece, Automation for Executive Management Program, p. 2.

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