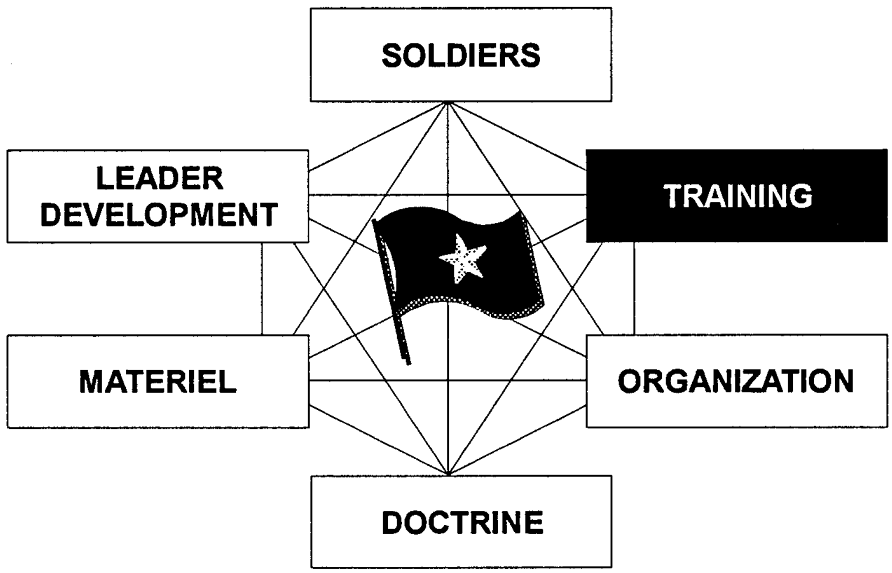
Mobile Strike Force Training: Implications for Force XXI



FY 95 Mobile Strike Force
Battle Command Experiment

Michael C. Ingram and
MAJ Peter J. Martin
TRADOC Analysis Center
Fort Leavenworth, KS 66027-2345

November 1995

Approved for Public Release;
Distribution Unlimited

Introduction

The unprecedented challenges of transitioning to the fighting force of the 21st Century are reflected in the Army's emphasis on the Force XXI axes: the Table of Organization and Equipment (TOE) Army; the Institutional Army; and digitization, the principal enabler of change. Identifying requirements to achieve Force XXI objectives will help the Army to meet future challenges. If future technological advances, revolving around information, are to be effective the Army will have to train future leaders to achieve other even more complex objectives than simply maximimzing lethality and minimizing losses. The question is how do we define requirements for leader training in this impending environment? The complexities of training leaders for this role have never been greater.

This paper highlights findings to address battle command issues developed during the Fiscal Year (FY) 95 Mobile Strike Force Battle Command (MSF/BC 95) Experiment, and insights from the experiment which have implications for Force XXI training. The MSF/BC 95 Experiment was one of four analytic components of the FY 95 Prairie Warrior Mobile Strike Force Advanced Warfighting Experiment (PW/MSF 95 AWE). The battle command issues shown below were examined with the MSF, a notional division-plus sized unit used by the Army to investigate advanced warfighting concepts and issues relative to building the future force.

- *What are the effects of individual information technologies on division staff processes and organization?*
- *How will digitization collectively affect division staff processes and organization?*
- *What are the observed leader development requirements for information operations (IO)?*

The Vision

Force XXI is the Army's vision of the future force - the Army for the next century of warfare. Force XXI reflects a visionary, proactive approach to preparing to meet the challenges in the 21st century. Force XXI is the information age force and its development at all echelons will focus upon connectivity, interoperability, and usability of information systems. Information is the key to a knowledge-based force where all echelons of command have high levels of situational awareness at all times. Force XXI will use the power of information to dominate its extended battlespace. The effectiveness of Force XXI will depend on the advantage gained through the exploitation of information at all echelons. Finally, Force XXI will be prepared to operate in an unpredictable and quickly changing environment.

Study Focus

To support the Battle Command Battle Laboratory (BCBL) and the PW/MSF 95 AWE, the issues described above were examined by the Training and Doctrine Command (TRADOC) Analysis Center (TRAC). Force XXI training implications could be surmised because the BCBL developed a surrogate environment for Force XXI during the experimentation. This experimental environment is described below. Although no training issues were explicitly identified by BCBL and tasked to the study team, the methodology for data collection allowed examination of the training area. Two types of training issues were examined and are discussed in this paper - those related to requisite knowledge-based force competencies and those related to the leader development pillars.

Analytic Methodology

The analytic context is described below. The linchpin of the methodology was data collection, which in this environment is very challenging. There were three sources of data, besides historical information derived from the literature review, which were used to identify training implications. First were observations made during all the Battle Command Elective (BCE) experiences described in the following section. Second, interviews were conducted with various participants of the experiment, as well as with various members of the BCE, throughout the experiment. Third, and probably most important, were student surveys which assessed literacy and leader competencies and the sources of both.

Analysis focused on the surveys. Observations and interviews were used to corroborate the results of the surveys. Again, the two areas examined were knowledge-based force competencies and leader development pillars. These will be discussed below.

Experimental Environment

To support this investigation, TRAC focused on the Command and General Staff Officer Course (CGSOC) class of 1995 - specifically the 73 individuals in A308, Battle Command Elective (BCE). The BCE comprised the command and staff elements of the MSF, a notional unit used for Force XXI experimentation. As stated in *TRADOC Pam 525-5, FORCE XXI OPERATIONS,* the MSF was designed to be "rapidly tailorable, rapidly expansible, strategically and effectively deployable as part of a joint and multinational team to achieve decisive results in future war and OOTW in all operational environments." For the 1995 experiment an active duty general officer was designated to command the MSF. Otherwise the MSF was staffed by students.

The BCE program of instruction included tactics, fire support, intelligence, reasoning skills, and guest lectures, as well as three simulation exercises (SIMEXes) and Prairie Warrior (culminating CGSOC end of course exercise). The MSF used a variety of information technologies during the SIMEXes, centered on the Phoenix battle command decision support system. Phoenix capabilities and functions were intended to enhance situational awareness to support staff planning and execution of tactical operations.

The command and staff of the MSF also were organized under a new staff concept - the Digitized Battle Staff (DBS). The DBS concept proposed an alternative division headquarters which reduces the fragments, stovepipes, and hand-offs which were said to characterize the current heavy division headquarters. DBS would create an internetted, and at least partially nonhierarchical, "combined arms staff." This staff would organize around core staff processes and focus on enhancing the MSF Commander's exercise of battle command in a parallel, fragmented, chaotic, joint and combined battle space. Multifunctional staff members would conduct cross-battlefield operating systems (BOS) processes and rely upon a commander-focused knowledge base, supported by comprehensive decision support and execution monitoring tools. The command and staff would use an information exchange system that promotes the necessary levels of horizontal integration and produces virtual collection among the staff and external elements critical to success. The net result is an organizational and core staff redesign (enabled by fully leveraged, modern information technologies) to significantly enhance the staff's support to the commander.

Thus, the experimental environment in which the BCE operated was one in which they had to learn and execute three concepts - MSF, DBS, and IO. This was a task recognized by the MSF Commander as extremely challenging for the students and recognized by the TRAC study team as confounding to the analytic effort. However, this environment also provided the opportunity to develop a myriad of insights which would not have been otherwise possible.

Institutional Environment

The BCE was a holistic training environment, although institutionally based in the Command and General Staff College (CGSC). Because the experience was institutionally based, there were certain aspects to the training of the students which must be recognized. Students in the Army institutional setting follow a "green sheet" with class hours and a program of instruction (POI) with scheduled events. Students expect instructors to adhere to the published schedules and POI. When classes go late or start early with little notice, many students may become unreceptive to the information, however important it may be to them, their future career, or the future Army. The BCE exceeded student expectations and published CGSOC schedules regarding time requirements, apparently diminishing the experience for some students. Given that, the specific components of the experience are described below. These descriptions and assessments are derived from observer participation in all of these events and discussions held with students throughout the BCE and subsequent to Prairie Warrior.

- *Lectures.* Classroom lectures provided the students with refresher training on the subjects of tactics, fire support, and intelligence. These topics had been taught to some degree during the first semester. Many students felt that the time spent on these subjects in the BCE second semester was needed elsewhere, specifically working hands-on in the BCBL. The initial six weeks of the BCE were dedicated to this mode of instruction. A series of lectures on practical reasoning skills was also presented. The students worked together on many practical exercises during these lectures to highlight key learning points. For example, much of what was taught was reinforced with vignettes from Desert Storm and notional military exercises.

- *Computer Training.* Initial training on the Phoenix system followed the classroom instruction. Students received six hours of hands-on training on the system. This level of training was only introductory in nature. Students were concerned when they could not use the systems and generally became frustrated with their lack of competency, though their ability to use Phoenix increased with exposure to the system throughout the SIMEXes.

• *SIMEXes.* To prepare for Prairie Warrior, the BCE participated in three SIMEXes to enhance their understanding of the Phoenix system, and the MSF, DBS, and IO concepts, reinforcing classroom instruction. The first SIMEX was intended to increase familiarity with the Phoenix system and understanding of the DBS concept. Even so, individuals were both unfamiliar and uncomfortable with their roles in the DBS after the first SIMEX. This was mitigated as the second and third SIMEXes were conducted.

• *Guest Speakers.* Guest speakers provided the BCE with a diverse perspective of the Army of the past, present, and future. The speakers varied in their effectiveness.

• *One on Ones.* One method used by the MSF Commander to train the BCE as command and staff of the MSF proved very effective. One-on-one Commander/section discussions enhanced staff understanding of the commander's intent and allowed for direct questioning of the Commander. This also occurred during AARs and key leader meetings to some degree. However, the key leader meetings sometimes took place after four to five simulation hours in addition to regular morning class.

• *Brown Bag Lunches.* The MSF Commander also conducted brown bag lunches to develop the tactics, techniques, and procedures (TTP) for the MSF.

• *Social Events.* Several informal social events were sponsored by the MSF Commander to build unit cohesion. These included two socials at post officers' club facilities and an MSF Golf Tournament.

Analytic Results

Knowledge-based Force Competencies

• *Technological Literacy.* Observations made by the TRAC battle command support team during the FY 94 Battle Command Advanced Warfighting Experiment (BC AWE 94) indicated that computer and general technological literacy among the BCE students was not as high as generally hypothesized by members of the combat developments community. The level of student computer and technological literacy was hypothesized to be high by most personnel involved with the AWE, primarily based upon the presumed exposure of these personnel to information age technology and processes, both in prior operational assignments and at CGSOC. Furthermore, unless significant improvements are made in usability and ease of use beyond current prototype information technologies, a relatively high level of technological literacy will be required to adequately command Force XXI and staff it for decision support. Because technological literacy was not even considered to be an issue prior to the AWE, there was not a tool developed to capture data in this area during the 1994 AWE. During the BC AWE 94 the TRAC team identified the fundamental knowledge-based force technologies to be automated planning tools, geographic information systems (GIS), and collaborative tools (e.g. VTC).

Because of the concerns over the technological literacy of the current generation of CGSOC officers, which surfaced as the result of chance observations during 1994, TRAC developed a survey to evaluate the technological literacy of the 73 BCE students in 1995. It was first administered during the BCE on 5 January, 1995. The technology literacy survey was administered a second time during the BCE on 25 April, 1995. The table below presents the results from the two BCE surveys. The re-survey was conducted to help assess the effect of the total BCE experience through SIMEX 3 on individuals' technology literacy. Both the distributions and means of the responses are shown in the subsequent table. The first row of data shown beside each technology are the results from the first survey, while the second row presents the second survey data. The survey was also administered to a control group selected at random (stratified by branch based on the branch structure of the BCE) by the Command and General Staff College (CGSC). The survey (73 total) was distributed and returned through the CGSC internal mail. The first 38 surveys returned by the due date were used for comparison with the BCE. The decision to use these 38 was based on the fact that the branch structure of these returns proved to be statistically no different from the basic branch structure of the BCE. The survey was not re-administered to the control group.

	(1) Totally Illiterate	(2) Some Familiarity	(3) Competent	(4) Very Comfortable	(5) Totally Literate	Mean of 1-5 Scale
VTC	25	29	10	6	3	2.08
	5	31	24	11	2	2.64
COMM FAX	2	21	20	18	12	3.23
	3	15	21	24	10	3.32
TACT FAX	16	34	12	5	6	2.33
	10	29	18	12	4	2.6
Windows	3	19	20	20	11	3.23
	0	9	21	18	24	3.63
DOS	6	28	18	12	9	2.86
	1	21	18	24	9	3.26
Unix	47	20	4	1	1	1.48
	31	27	8	7	0	1.88
Word	1	8	22	24	18	3.68
Processing	0	5	14	34	20	3.95
Graphics	4	14	21	24	10	3.3
	0	10	16	33	14	3.7
Spreadsheet	18	24	18	8	1	2.42
	6	25	20	16	6	2.88
DBMS	17	32	15	8	1	2.23
	11	26	18	13	5	2.66
Comms	13	29	16	12	3	2.49
	4	21	21	20	7	3.07
Auto Plng	47	17	7	1	1	1.52
Tools	18	19	26	8	2	2.41
GIS	53	18	2	0	0	1.3
	29	27	11	5	1	1.93

N = 73

There appeared to be a general rise in the level of the self-assessment of technological competency. To determine if there were a statistically significant difference in the two data sets, a difference of means test was performed. This test indicated that there was a statistically significant difference between the first and second survey data. The implication is that the experience of the BCE had an overall positive effect on the technological literacy of the students. To more precisely isolate which technologies the BCE might have most affected, the difference in the means was examined. Analysis showed the fundamental knowledge-based force technologies, VTC, automated planning tools, and GIS were among those in which competency changed the greatest, although this change was from absolutely low levels. This implies that the experience of the BCE had one of the desired effects upon the students, that of raising awareness and competency in these key technologies.

Key technological literacy findings are listed below.

✓ No statistically significant difference, at the 95 percent confidence level, existed between the responses of the BCE and the CGSOC as a whole, as represented by the control group. A paired difference of means test showed this to be true. The correlation between the two groups of means was also determined to be very high. Therefore, the BCE is appropriate to use as a representative sample of the CGSOC as a whole for this type of research.

✓ Three of the four lowest ranked competencies (GIS, Automated Planning Tools, and VTC) are the fundamental capabilities of a 21st century knowledge-based force. GIS, the lowest assessed competency, is the key technology for Force XXI command and control because all digital map-based C2 systems are essentially GISs.

✓ Competency in the Unix operating system, which is the operating system for the BCBL's Phoenix system, was assessed as second lowest. This is a notable consideration only if the user interface available with the system is not reliable or stable and the operating system is directly encountered by the users.

✓ Word processing and graphics were assessed as first and second highest. This is likely a reflection of the usual exposure to office applications which introduces personnel to computer usage. Commercial facsimile and *Windows* were the next highest, and can be explained in this same vein.

• *Multi-functional Literacy.* In November 1994 the BCBL made the decision to experiment with the DBS concept in the 1995 experiment. In the past several years the concept of multifunctional or generic staff officers has appeared as an enabler to optimize automated battle staffs. The organizational and process changes explicitly or implicitly required by the DBS concept are not discussed in detail here; however the DBS concept which the BCE employed specifically depends on the use of multifunctional staff officers. The requirement for multifunctionality of staff is explicitly stated in the concept and in several briefings the study team heard.

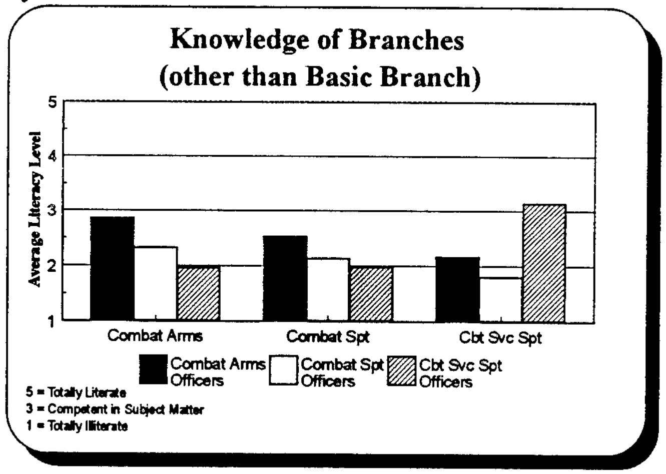
Although there was not an explicit data collection effort on multifunctional staff officers in the 94 AWE, there was no significant observed multifunctionality among the 1994 BCE students. The limit of multifunctionality appeared to be across several branches of a battlefield operating system (BOS), such as an infantry officer also having competency in the other maneuver branches or a quartermaster having competency in multiple combat service support branches. Triggered by the reiteration of the multifunctionality requirement during briefings of the DBS concept in 1995, and based on the limited degree of multifunctionality observed during the 94 AWE, TRAC decided to make this component a part of the overall literacy assessment. A tool was developed to examine the current level of branch and BOS multifunctionality among the students in the BCE. This survey was similar to that for technology literacy, except that the self-assessment of literacy is by branch and BOS.

This survey was an additional requirement to the BCE survey schedule and control over the returns could not be as tight due to individual students' class schedules. Therefore, the study team validated for use the surveys of the first 58 respondents, who both met the due date for return and correctly completed the survey. These first 58 had a branch structure which was similar to the entire BCE. The response distributions and means are shown in the table below.

	Self Assessment Scale					
	(1) Totally Illiterate	**(2) Some Familiarity**	**(3) Competent in Subject Matter**	**(4) Very Comfortable**	**(5) Totally Literate**	**Mean of 1-5 Scale**
BRANCHES:						
Infantry	1	17	19	15	6	3.14
Armor	2	20	18	15	4	3.03
Aviation	4	27	20	3	4	2.59
Special Forces	6	40	8	3	1	2.19
Field Artillery	5	18	20	6	9	2.93
Air Defense Artillery	7	31	15	2	3	2.36
Military Intelligence	2	24	16	8	8	2.93
Engineer	3	29	18	4	4	2.6
Signal	6	32	15	3	2	2.36
Chemical	8	36	12	2	0	2.14
Quartermaster	11	23	15	5	4	2.45
Transportation	10	25	15	5	3	2.41
Ordnance	12	25	12	6	3	2.36
Adjutant General	12	27	13	3	3	2.28
Finance	17	32	6	3	0	1.91
Medical Service	13	30	11	1	3	2.16
BOS:						
Battle Command	0	17	16	23	2	3.17
Maneuver	0	12	15	24	7	3.45
Intelligence	0	13	24	17	4	3.21
Mobility/Surviv-ability	1	18	24	11	4	2.98
Fire Support	1	15	21	14	7	3.19
Air Defense	3	30	17	5	3	2.57
Combat Service Support (CSS)	2	18	19	14	5	3.03

N = 58

The branch/BOS literacy survey indicated that the BCE students are not currently multifunctional across more than the most closely related branches or BOS's. The data in the table show the variability of competency in branches and BOS's. Another way of looking at multifunctional literacy is through knowledge of branches other than an officer's basic branch. In the chart at right, the solid bars indicate the literacy level combat arms officers have regarding combat arms (other than their basic branch), combat support, and combat service support. Likewise, the literacy that combat support officers have about combat arms, combat support (other than their basic branch) and combat service support is shown by the white bars. Finally, the hatched bars provide CSS officer self-assessments of literacy in combat arms, combat support, and combat service support, again, other than in their basic CSS branch. The only area in which average literacy was above the "competent" level was in the knowledge of CSS officers about CSS branches other than their own. The next highest literacy level was in the knowledge of combat arms officers regarding other combat arms branches and combat support branches. Other areas of concern revealed by the coefficient of variation, another measure examined in the analysis, are air defense and chemical branches, where high variability and low mean competency indicated a lack of strong knowledge of these branches among the BCE students.



When responses of all 58 students were considered, the only branches which had a mean assessment of competent or better were infantry and armor. For the BOSs, only two (Air Defense and CSS) failed to rate a mean assessment of competent or better. When there were multiple branches associated with a single BOS, it may have been easier for the students to assess their competency higher across the BOSs than across the spectrum of branches. Shifts rightward on the scale in the intelligence and air defense BOSs may reflect the integrative nature of BOSs perceived by the BCE students. Observations generally corroborated the survey results.

Key multifunctional literacy findings are listed below.

√ The multifunctional self-assessments and observations of the BCE students indicated that the officer corps is not currently multifunctional across more than the most closely related branches or BOSs.

√ The combat service support branches were generally low ranked. The competency among members of the MSF in the CSS branches was also highly variable, reflecting a lack of cross competency into the logistics arena. Chemical and special forces were also low ranked, but as opposed to the CSS branches, were not highly variable. This indicated very little other than specialist competency available for these branches within the MSF.

✓ Air defense, the lowest ranked BOS, was also the most variable. This indicated a significant lack of cross competency into this BOS.

• *Leader Competency.* To address the leader development requirements for IO, the study team's review of literature included research of past and current doctrine, future concepts, and leader development studies. The set of nine competencies shown in the chart was prevalent throughout these sources. These nine leadership competencies, developed in 1976 following a study of leaders from corporal to general, were specifically listed in Field Manual (FM) 22-100, *Military Leadership.* While it is possible this set might actually change in the future, it is more likely some of the competencies will shift in importance or become more difficult to acquire, or be affected positively or negatively with the onset of digitization. Given an expectation of continuity in the competencies, the analysis plan was then structured to determine if shifts in the importance or difficulty of acquiring any of the nine competencies might be expected in a knowledge-based environment. A TRAC-developed student survey was administered twice during the course of the BCE, to both the BCE and a CGSOC control group.

Leader Competencies

- Communications
- Supervision
- Teaching and Counseling
- Soldier Team Development
- Technical and Tactical Proficiency
- Decisionmaking
- Planning
- Use of Available Systems
- Professional Ethics

This section discusses the results of the surveys integrated with interviews and observations for three of the competencies - decisionmaking, use of available systems, and technical and tactical proficiency. These three are the most obviously linked to the salient features of the experimental context. Key leader competency findings will cover all nine competencies. Detailed discussion of the research into leader competencies and findings is found in the TRAC monograph, *Leader Competencies: Implications for Force XXI.*

The decisionmaking competency was highly ranked in importance. The surveys indicated that neither the BCE students nor the control group changed their opinions about the relatively high importance of decisionmaking. However, while the control group also did not waiver in their assessments of the difficulty of acquiring the skill, the BCE students indicated that acquiring competency in decisionmaking will be more difficult for officers of the future than they initially thought. There are several factors that could contribute to this result. First, information overload, or "too much data," was frequently cited as an element that can complicate decisionmaking. This information, increased in volume and perhaps complexity, may be compacted into a much shorter time window, possibly without proper filtering. Another factor may be related to a different intensity in the BCE versus the general CGSOC training environment. The BCE students received time-sensitive, consequence-related feedback on their decisions through the simulation environment - and through interactions with the MSF Commander, an active duty general officer. The students in the control group practiced the deliberate decisionmaking process and combat decisionmaking just as often as the BCE students in their respective CGSOC courses, but the curriculum (up until the Prairie Warrior exercise) did not provide the opportunity for the control group to experience this immediate feedback on complex decisions at brigade and division level through simulated battle. This feedback was reinforced by similar comments from one of the FY 94 BCE students, who noted last year that he had participated in at least seven decisionmaking exercises during the first term, but that the January 1994 SIMEX provided the first battle results feedback on the quality and impact of his decisions as a student. This feedback was further reinforced by the 1995 students in their course evaluation. SIMEXes as an effective teaching technique was identified by 79 percent of the respondents. They also stated that SIMEXes, progressive and sequential in level of difficulty, should be integrated into the core CGSOC curriculum.

Regarding the use of available systems, specifically information technologies, the CGSOC experience apparently affected perceptions in both groups through familiarization lectures and hands-on requirements. Both groups acknowledged a small increase in importance of the competency. In the BCE, perceptions of the difficulty of acquisition of this competency declined significantly, most likely because of additional exposure to the systems. Initial apprehensions about using Phoenix declined through the SIMEXes; however, this change does not imply the user interfaces were adequate. Students did note an improvement with Phoenix capabilities from the initial exercise, but still identified many potential improvements. Augmentees to the MSF for Prairie Warrior experienced severe problems from unfamiliarity with the system at the onset of Prairie Warrior; some students were able to gradually overcome those difficulties as the exercise progressed, while others were unable to effectively use the system even on the last exercise day.

Both the BCE and control group ranked technical and tactical proficiency very high in importance. While there were no statistically significant changes in either group for importance or difficulty, both groups described some potential effects of advanced technology on technical and tactical proficiency. As technology increases, officers will be hard pressed to keep their proficiency level up to the established standard. Specifically, senior leaders may be surpassed by technology and not understand how to integrate advanced technology into operations. Senior leaders may be inclined to fall back on familiar processes that have worked throughout their careers. For example, some BCE students felt they fought today's tactics with tomorrow's technology during the BCE. They were told initially they would create their own, new way of fighting the force of the future, but some felt this objective was not met. Conversely, an over-reliance on technological advances of the future may create a situation where manual skills will wane. Manual skills are critical as backup if the digitized force experiences degraded situations or a catastrophic failure because of future countermeasures.

The key findings regarding leader competencies are listed below.

✓ In the BCE knowledge-based environment, the most important competencies were assessed to be professional ethics, communications, technical and tactical proficiency, and decisionmaking. These were also identified by the students as the most difficult to acquire.

✓ Decisionmaking will be more difficult for future officers due to information overload, complexity of information, and compartmentalization.

✓ The ability to communicate in the digitized, information environment will be a critical link if future advanced technologies are to be employed effectively.

Competency in communications and use of available systems were shown to be more easily acquired with exposure to advanced technologies.

✓ Professional ethics may be more difficult in the digitized environment as access to information provides the opportunity and temptation for unethical actions and makes ethical decisions more complex.

✓ Technical and tactical proficiency will remain an extremely important competency.

✓ Planning becomes even more important in the digitized environment because synchronization is required to maximize the effects of advanced weapons systems.

Leader Development Pillars

Each of the three surveys previously described also requested respondents to identify the leader development pillar (s) (institutional, operational, and self-development) which contributed to the assessed competency, regardless of level of competency. Besides identifying which pillars were contributory, the respondents were asked to rank the pillars' contributions. Pillar contributions were not sought in the technological re-survey.

- *Institutional.* Technology contributions of the institutional pillar were clearly less valued than those from the other two pillars. The institutional pillar was marked as the one of the three most often contributing to branch and BOS competency. This reflects the fact that it is the institutional pillar which is responsible for formal development of literacy in branches and BOSs.

- *Operational.* The operational pillar was clearly the most valued for technological literacy applications: Windows, DOS, word processing, spreadsheet and DBMS. The proliferation of personal computers and office automation suites of software are likely to be one reason for this result. Almost every member of the BCE had a personal computer for home use to support self-development of literacy in these areas. The operational pillar was also the most valued for both branches and BOSs, and operational assignments contributed the most to competency development in both the BCE and control groups for leader competencies. It follows that since officers and soldiers spend most of their time in operational assignments they would acquire the majority of leadership skills while in these assignments. For the BCE, operational assignments were assessed as the most important pillar for 8 of the 9 competencies. For the control group, operational assignments were the greatest contributor for 6 of the 9 competencies in the first survey and 8 of 9 in the second. By the end of the CGSOC experience, those students had seemed to re-think the relative contributions of all pillars to their technological literacy.

- *Self-Development.* Self-development was the least valued pillar for both BOS and branch competency. Moreover, this pillar was significantly less valued across the board, indicating one of two things - that the students either do not find self-development valuable or they are simply ranking it third consistently. This is probably a result of the emphasis placed upon officers during this period in their career relative to operational experiences and certain institutional ones (e.g.

CGSOC). Among leader competencies, only professional ethics was believed to be developed primarily by self-development.

Key leader development pillars findings are listed below.

√ The major contributors to the technological competency which the BCE students have achieved have been the operational and self-development pillars. The institutional pillar has been a much less frequent contributor to technological competency than the other two pillars. Further, it was reported that the value of contribution of the institutional pillar, when it contributed, was the lowest of the three.

√ The technological literacy re-assessment indicated that the BCE experience had the effect of raising the mean competency in all the technologies. It is given that there could have been interaction effects from the CGSOC as a whole during this period; however, if the key technologies are isolated the effect of the BCE is apparent. The change in competency with automated planning tools and GISs was significantly higher than all others.

√ The major contributors to branch and BOS competency of the BCE students have been the institutional and operational pillars. The institutional pillar has a slight edge in frequency of contribution, and the operational pillar was noted as the most valuable. The self-development pillar has been a less frequent contributor to branch competency than the other two pillars. Further, it was reported that the value of contribution of the self-development pillar, when it contributed, was significantly lower than the other two.

√ Officers were shown to gain the majority of their competencies from operational assignments. Unit experience was assessed as the primary contributor for all competencies except professional ethics.

Conclusions

The focused effort to assess technological literacy proved to be extremely valuable. The information obtained by survey regarding the degree of individuals' competency in the various technologies and the sources of that competency provides the Army leadership with a baseline methodology and data set for further research in this area. The findings refute some commonly held notions that living in the environment of the information age society alone will take care of much of the problem of becoming technologically literate to the degree required of leaders in Force XXI.

The effort to assess multifunctional literacy also proved to be highly valuable. Given the fact that the notion of multifunctional or "generic" staff officers surfaces periodically as part of a solution to reducing staff through automation, the results of the survey, and corroborating observations and interviews are very timely. The fact that the Army has not developed multifunctional officers who can perform many branch or BOS functions and tasks competently does not mean it has failed to accomplish this mission previously. The development of multifunctional officers has not been required. However, the degree to which officers are multifunctional at this point in time, and the identification of the source of that competency, are powerful pieces of information for the Army leadership determining the role of leader development in Force XXI.

The identification of those leader competencies which most concern officers who have experienced the environment of Force XXI is also significant information for the training community. The complications of decisionmaking in the knowledge-based environment is important information for the trainers of the future force. The mitigation of difficulties with the use of available systems through a holistic development experience like the BCE was a significant insight.

Finally, the information regarding the assessed contributions of leader development pillars joins these findings together as they relate to training the future force. By examining the relative contributions of pillars the Army can determine which of them can be leveraged to maintain standards in Force XXI. Army leadership, and those with the purview for the training of the future force must make these determinations.

Recommendations

Based on the analysis of the various surveys, observations, and interviews from two years of examining future leaders in a knowledge-based, advanced technology environment, the study team makes the following recommendations.

- ✓ Competency in the fundamental knowledge-based force technologies must be increased.

- ✓ The institutional pillar must be strengthened to contribute more often and more valuably to the development of technological competencies.

- ✓ Thoroughly integrate information technologies in school curricula.

- ✓ Emphasize the self-development pillar to attain multi-functional literacy.

- ✓ Review all institutional curricula to ensure that emphasis on the leader competencies is placed at the proper levels and on the proper competencies.

- ✓ Review and update programs of instruction in leader competencies for the future force. Focus on decisonmaking and the use of available systems, thoroughly integrating advanced technologies.