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for the Behavioral and Social Sciences

Research Report 1799

The Computer Backgrounds of Soldiers in Army Units: FY01

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U.S. Army Research Institute

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14 ABSTRACT *(Maximum 200 words)*

A multi-year research effort was instituted in FY99 to examine soldiers' experiences with computers, self- perceptions of their computer skill, and their ability to identify frequently used, Windows-based icons. This report documents the results of the second and last year of surveys from soldiers in Forces Command units. The soldiers surveyed were from mechanized and non-mechanized Infantry companies, the battalion staff, and battalion slice elements (Medics, Combat Engineers, and Field Artillery). The officers and senior non-commissioned officers had the most computer expertise as measured by their icon scores. For junior non-commissioned officers, specialists, and privates, the picture was more diverse. Almost half of these soldiers had limited computer skills, as measured by both subjective and objective indices. Frequency of using a variety of computer features on a regular basis related highly to computer expertise. When specialists and corporals were examined separately, opportunity to use computers as part of their duty position was also related to computer expertise. The results indicate that young soldiers with limited computer skills would benefit from basic computer training prior to learning specialized training on the Army's new digital systems.

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The Computer Backgrounds of Soldiers in Army Units: FY01

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FOREWORD

In FY99, the Infantry Forces Research Unit of the U.S. Army Research Institute for the Behavioral and Social Sciences instituted a multi-year research effort to examine the computer backgrounds of soldiers. When the research began, a widely held notion was that young soldiers joining the Army are computer savvy, whereas senior noncommissioned officers have limited computer skills. The research was designed to examine the validity of this assumption, and to examine the trends in computer literacy of soldiers. Soldiers enrolled in four Infantry School courses were surveyed over a three-year period. In addition, soldiers within Forces Command units (FORSCOM) were surveyed over a two-year period. This report presents the results of the second FORSCOM survey. The report also determines if any segment of the Army might benefit from basic computer training prior to working with advanced digital systems.

Soldiers from three Army installations participated. At each installation, all members of an Infantry company were surveyed, plus the battalion staff and attached soldiers from Field Artillery, Medical, and Combat Engineer units. The officers and senior noncommissioned officers had the greatest computer expertise as assessed by the objective and subjective indicators of computer skill in the survey. For the remaining junior enlisted soldiers and noncommissioned officers, the picture was more diverse. Although a substantial percentage of soldiers from these groups had computer skills, many had limited skills. The results were consistent with the previous surveys, and indicated that many soldiers would benefit from basic computer training prior to learning the specialized software in the Army's new digital systems. The results also reflect the increased availability of computers within the U.S. over the past 15 to 20 years.

The survey findings are valuable to the user community, as they can impact the design of training for digital systems and training resources. The findings were briefed to representatives from the U. S. Army Infantry School in August 2001 and to the Land Warrior Manpower and Personnel Integration (MANPRINT) Working Group in August 2001.

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COMPUTER BACKGROUNDS OF SOLDIERS IN ARMY UNITS: FY01

EXECUTIVE SUMMARY

Research Requirement:

The Army has introduced digital systems throughout the force. The ability of a soldier to exploit system capabilities and learn specific system software in a short period of time depends in part on the soldier's prior computer experience. A three-year effort began in FY99 to determine the computer backgrounds of soldiers in Infantry units. The focus was on general computer skills that might transfer to using the Land Warrior system and other digital systems. Soldiers attending Infantry courses at Fort Benning, Georgia and soldiers in Forces Command units (FORSCOM) were surveyed. This report is on the second FORSCOM survey conducted in FY01. It examines trends in computer skills, the widely-held assumption that senior noncommissioned officers possess fewer computer skills than younger soldiers, and whether any group of soldiers would benefit from basic computer training before learning the specialized software embedded in the Army's new digital systems.

Procedure:

Soldiers (n = 646) from three Army installations were given a survey that examined their experiences with computers, self-perceptions of their skill, and an objective index of skill as measured by the ability to identify commonly used icons and icons representative of those in the proposed Land Warrior software. Soldiers from three non-mechanized and two mechanized Infantry companies, their battalion staffs, and soldiers from elements supporting the battalions, specifically the Combat Engineers, Field Artillery, and Medics, participated.

Findings:

The officers and senior non-commissioned officers had the most computer expertise and were the most homogeneous on both objective and subjective indicators of computer skill. For enlisted soldiers and junior NCOs the picture was more diverse; almost half the soldiers had limited skills. As rank increased, so did the percentage of soldiers who owned and used computers in a variety of ways. Of special interest were findings related to duty position and age. The opportunity to use a computer within a unit varied with duty position, with Medical personnel and battalion staff most likely to use computers in their units. Over 80% of those under age 24 had used a computer in high school, while none of the soldiers and officers over age 38 had done so.

Utilization of Findings:

The findings clearly showed a great diversity in computer background and experience within the Army populations surveyed. For some, computer experience was limited; they rated themselves as novices, a finding supported by the survey results from Infantry School courses. For others, computer experience came from different sources, and resulted in different levels of expertise and knowledge, with the most skilled possessing computer programming skills. This diversity, as long as it exists, will impact the training design and training management for new digital systems, as these systems, to varying degrees, assume soldiers have a core of computer skills and knowledge. Trainers will need to focus on basic computer skills before they can effectively and efficiently train the specific skills required by a tactical system. But for other soldiers, this prerequisite training will not be necessary. Training packages for any of the Army's digital systems should include training on basic computer skills for soldiers with limited computer skills before they receive the specialized training required by new digital systems.

COMPUTER BACKGROUNDS OF SOLDIERS IN ARMY UNITS: FY01

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THE COMPUTER BACKGROUNDS OF SOLDIERS IN ARMY UNITS: FY01

Introduction

Digital technology is a relatively new, yet rather common, component of major Army systems. Presently, many digital systems provide information to commanders of units at the battalion level and above in tactical operations centers (GAO Report, 2000). Furthermore, some systems are integrated into vehicles, such as the Bradley Fighting Vehicle (BFV) A3 (General Accounting Office [GAO], 2000). In addition, in the future, individual soldiers will have wearable computers. The Land Warrior (LW) system (Goodman, 1999) is an example of a digital system that will be used at the soldier level.

The introduction of digital technology has raised an important issue of how to train soldiers possessing varying levels of computer expertise. In 1994, Van Vliet, Kletke, and Chakraborty showed that experienced individuals required advanced training to increase their skill levels; whereas novices experienced great difficulty learning advanced material without having introductory-level training. Trumbly, Arnet, and Martin (1993) found that task performance increased significantly when software interface characteristics were matched to the user's computer knowledge (e.g., expert interface to expert user). Consequently, a "one size fits all" approach to training computer software does not appear to be efficient or the most effective approach. Research has also shown that greater computer knowledge acts as a precursor to the adoption of new computer technology and its sustained use (Scott & Rockwell, 1997). Thus it is important to assess the computer knowledge and skill of soldiers before beginning training on new computer or digital systems.

The computer literacy among soldiers in the Army is changing, a reflection of the availability of computers within American society as a whole. Changes in digital technology have generated much speculation about the computer background of soldiers. In FY99, the Infantry Forces Research Unit instituted a multi-year research effort to examine the computer backgrounds of soldiers. The impetus for this research effort was the Land Warrior (LW) system. The LW system is a dismounted soldier system to be used by a large population of soldiers, ranging from the rifleman to the company commander, as well as soldiers who are attached to Infantry battalions such as Medics, Engineers, and Field Artillery. Although the research focused on the LW population, the results have applicability to other soldier populations.

In FY99 when the research began, it was widely believed that young soldiers joining the Army are computer savvy and senior noncommissioned officers have limited computer skills. The research was designed to examine the validity of this assumption and to examine computer use trends over time. Soldiers enrolled in four Infantry School courses were surveyed over a three-year period. Soldiers within Forces Command units (FORSCOM) were surveyed over a two-year period. The survey information was intended to provide insights on which segments of the LW population might benefit from computer training, as well as the computer tasks most likely to require training.

At the heart of the LW system is a wearable computer using a Windows operating system with menu- and icon-based software. Soldiers will use the computer to perform tasks and functions previously performed manually. For example, the computer allows soldiers to send digital messages and overlays, and to use a global-positioning system to show their individual positions on a digital map. The LW software has unique attributes and functions that must be trained, and its use requires a basic understanding of different computer skills.

In FY99, FY00, and FY01, four Infantry courses were surveyed: Infantry One Station Unit Training (OSUT), the basic Noncommissioned Officer Course (BNCOC), the Advanced Noncommissioned Officer Course (ANCOC), and the Infantry Officer Basic Course (IOBC). The findings from each of these yearly surveys are reported in Dyer and Martin (1999), Fober, Bredthauer, and Dyer (2000), and Singh and Dyer (2001). Overall, a total of 2,135 Infantrymen participated. In general, the survey trends indicated that the officers and the senior noncommissioned officers (NCOs) scored better on both subjective and objective indices of computer skill as compared to the young enlisted soldiers. Furthermore, the survey results indicated a yearly increase in computer ownership and computer usage among all soldiers, which is consistent with the civilian population (Coley, Cradler, & Engel, 2000).

In FY00, mechanized and non-mechanized Infantry units in FORSCOM were surveyed (Fober, Bredthauer, & Dyer, 2001). The FORSCOM survey expanded and complimented the three-year research effort with institutional courses. It covered the broader population of soldiers scheduled to receive the LW system. All duty positions within an Infantry rifle platoon plus the rifle company headquarters, battalion staff members, Medics, Combat Engineers, and Field Artillery were included. A total of 691 soldiers was surveyed. The findings were consistent with the three-year research effort on the institutional courses; that is, the young enlisted soldiers were not as computer savvy as the officers and the senior NCOs. Of special interest was an additional finding that the soldiers' work environment had an impact on their computer background, skill, and knowledge.

This research report presents the results of the second and last year of the FORSCOM surveys, conducted in FY01. The report extends the FY00 FORSCOM findings (Fober et al., 2001). The primary purpose was to determine the computer knowledge, skills, and backgrounds of soldiers in different Army units. The secondary purpose was to determine whether any segment of the Army population might benefit from basic computer skill training prior to actual training on a new digital system such as the LW.

Method

Participants

The surveys were sent to two mechanized Infantry units and one non-mechanized Infantry unit. Each unit was at a different Army installation. Mechanized Infantry units were included because they will be eventually fielded with the LW system, and some mechanized units will soon receive the BFVA3. Unit personnel distributed the surveys. The surveys were to be completed by all soldiers assigned to an Infantry company, the battalion staff associated with that company, all soldiers attached to the battalion from Field Artillery and Medics, plus one Combat Engineer platoon. A total of 666 surveys was returned, but only 646 surveys were used

for analyses because 20 surveys were not entirely completed. The units who returned the surveys differed slightly from the original guidance. From the non-mechanized Infantry battalion, surveys were received from three Infantry companies, instead of one company. In addition, no surveys were provided for Medics by one unit, and another unit provided no surveys for Combat Engineers.

The surveys were grouped in two ways, consistent with the FY00 FORSCOM surveys. One grouping was based on duty assignment (called battalion element): battalion staff, Field Artillery, Engineers, Medics, and Infantry rifle company members. The other grouping was by rank. The distribution of ranks within each battalion element is shown in Table 1. The senior NCOs (E6-E9) and the officers (O1-O5) were grouped together due to the low number of individuals in these two groups. Although these two groupings span a wide range of age and experience, they were represented primarily by the lower ranks within these groups, E6 and E7 (84 of 87) for the senior NCOs, and O1 and O2 (33 of 50) for the officers (see Table A-1).

Table 1
Number of Soldiers by Rank in Each Battalion Element

Rank	**Battalion Element**					
	Battalion Staff	Field Artillery	Engineers	Medics	Infantry	All Elements
E1-E2	4	26	7	10	83	130
E3	5	22	8	3	67	105
E4	13	24	23	14	88	162
E5	15	18	10	3	65	111
E6-E9	14	22	9	3	39	87
O1-O5	15	16	4	3	12	50
Total	66	128	61	36	355	645

Note. E1-E2 is private. E3 is private first class. E4 is specialist or corporal. E5 is sergeant. E6-E9 is staff sergeant, sergeant first class, first sergeant/master sergeant, and sergeant major/ command sergeant major. O1-O5 includes 2d and 1st lieutenants, captain, major, and lieutenant colonel.

Soldier rank was not distributed equally across battalion elements. The most common ranks varied with element. For example, specialists (E4s) constituted the most common rank within the Medics (40%), Engineers (38%), and Infantry (25%). For Infantry, the next largest group was privates (20%). For the battalion staff, the percentages of specialists, sergeants, senior NCOs, and officers were similar, each about 21%. Within Field Artillery, there were fairly similar numbers of soldiers in each of the rank categories, with privates being the largest group (20%), and officers the smallest (13%) (see Figure A-1).

For the enlisted soldiers, there was an obvious relationship between a soldier's age and his rank. Age increased with the increase in rank. The mean ages were: 20.44 (SD = 2.45) for E1-E2, 21.06 (SD = 2.33) for E3, 23.48 (SD = 3.03) for E4, 26.45 (SD = 3.92) for E5, and 32.30 (SD = 4.72) for E6-E9. The officers' mean age was 27.60 (SD = 5.39). Tables A-2 and A-3 present descriptive statistics on age by rank and battalion element. Tables A-4 and A-5 provide

descriptive statistics on months served in the Army. Time in the Army also increased with increase in enlisted rank. There was considerable variability in months served for different ranks, especially with the senior NCOs and officers.

Survey Instrument

The survey instrument is in Appendix C. It was developed during the FY99 research (Dyer & Martin, 1999). The original survey was revised to obtain the necessary demographic information to identify branch, unit, and duty position. In addition to demographic information, the survey focused on seven areas:

- Where soldiers have used computers in their formal education.
- Where they currently use computers.
- Whether they own a computer.
- How often they use specific computer features: a mouse, computer games, icon-based software, pull-down menus, graphics/drawing features, e-mail, and the Internet.
- Self-ratings of typing skill.
- Self-ratings of computer skill and what computer software/languages they use.
- An icon test, with 18 icons common in current software programs, was presented and soldiers had to name the function of each icon. The icons on the test were: spell check, cursor, zoom, open file, save, print, cut, copy, paste, undo, new file, arrow, recycle, help, center, fill, close, and group.

Survey items on computer features and Windows icons were included because the LW computer software is Windows-based. Therefore, familiarity with using features like a mouse or pull-down menus should enhance transfer of those skills to learning LW computer functions. Other features like e-mail and Internet use were relevant because soldiers using the LW systems will be connected via a wireless local area network. Furthermore, the use of Windows-based characteristics would provide an index of computer experience for all soldiers, given the dominance of Windows software in the academic and commercial worlds.

Results for Entire Sample

Results are presented first for the entire sample, by rank and by battalion element. These two dimensions were not examined in the context of a single analysis, as the resulting sample sizes were diverse and some were rather small (see Table 1). As mentioned, the specialist (E4) sample was large and distributed across the battalion elements. A separate analysis was conducted on these soldiers. These results follow those for the entire sample.

The rank breakout corresponded to the data collected from the Infantry School professional development courses. The most junior enlisted members were comparable to the OSUT (basic training) soldiers, the junior NCOs to BNCOC, the senior NCOs to ANCOC, and the youngest officers to IOBC. The unit surveys covered higher-ranking officers as well as enlisted soldiers at the ranks of E3 and E4 not included in the prior institutional analyses (Dyer & Martin, 1999; Fober et al., 2000; Singh & Dyer, 2001). Additionally, the present analyses

buttressed the prior research by including branches other than the Infantry, plus the battalion staff.

Inferential statistics were applied to the data, despite the unequal sample sizes for some of the groups compared. These results were used as a guide to help determine what differences were important to discuss. The authors acknowledge the confounding between the rank and battalion element variables (e.g., highest percentage of officers and sergeants were in the battalion staff). Complete descriptive statistics on the survey measures by rank and battalion element are in Tables A-1 through A-38.

The results on each key variable are discussed, followed by two graphs, one presenting the results by rank and the other by battalion element. The same type of graph (typically a bar graph) was used wherever possible. The graph format changed (e.g., line graph or stacked graph) if that format more clearly illustrated the findings.

Computer Use

Use in school. The survey was designed to obtain general information about the soldiers' current and prior experience with computers. The first background item related to the extent to which soldiers used computers in their formal education. Figure 1 shows the number of educational settings where soldiers used computers, compiled by rank. For example, if a soldier had only used a computer in high school, the tally was one. If a computer was used in junior high and high school, the tally was two. Figure 2 shows the use of computers in school, also compiled by soldier rank. Figures 3 and 4 show the same data compiled by battalion element.

An analysis of variance (ANOVA) on the total number of educational settings in which soldiers used computers as a function of rank was performed. The results of this analysis revealed a significant effect for rank, $F(5, 639) = 21.35, p < .000$. Post hoc comparisons[1] showed that E6-E9 soldiers used computers in the fewest number of educational settings compared to all other groups (see Figure 1 and Table A-6).

Examination of Figure 2 reveals that the percentage of soldiers using computers during their formal education varied across soldier rank and was primarily a function of age. A closer look at computer use in high school across the enlisted ranks demonstrates this point. As the mean age of the soldier ranks and ages went up, the computer use in high school decreased. As the ranks (and mean age) progressed from E1-E2 (20 years) to E3 (21 years) to E4 (23 years) to E5 (26 years) and lastly to E6-E9 (32 years), the percentage of soldiers using a computer in high school went from 91% to 86% to 75% to 59% and to 30%, respectively.

[1] Except where noted, for all post hoc comparisons with the analysis of variance, the Bonferroni test was used.

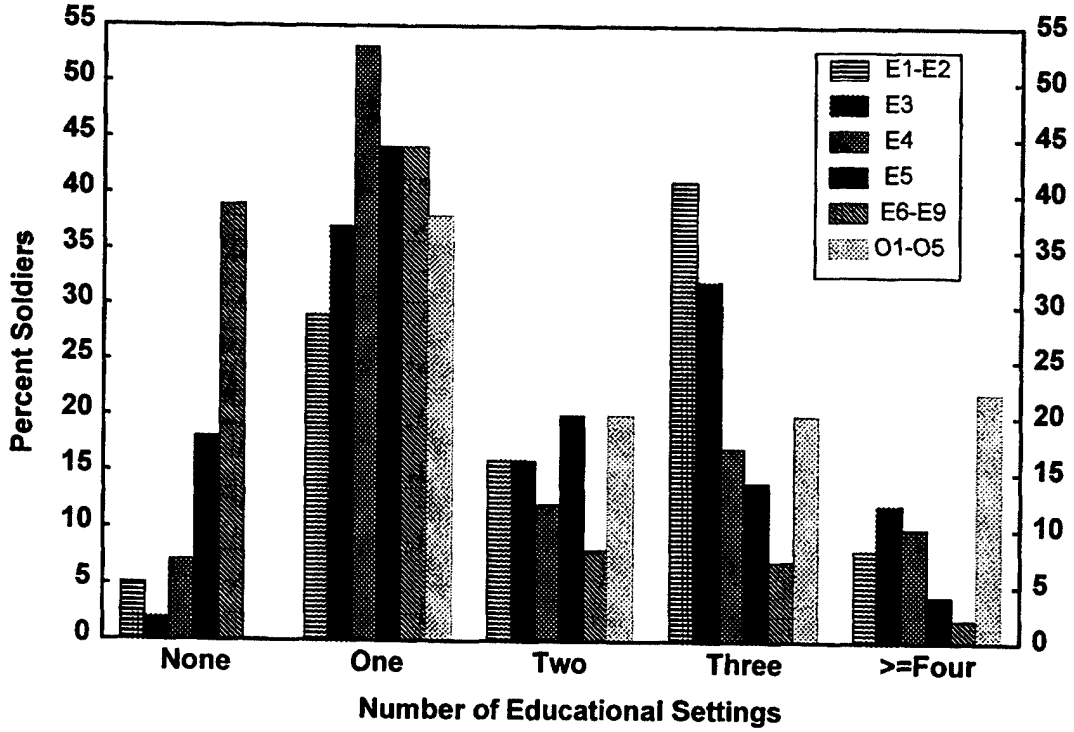

Figure 1. Number of educational settings where a computer was used, displayed by rank.

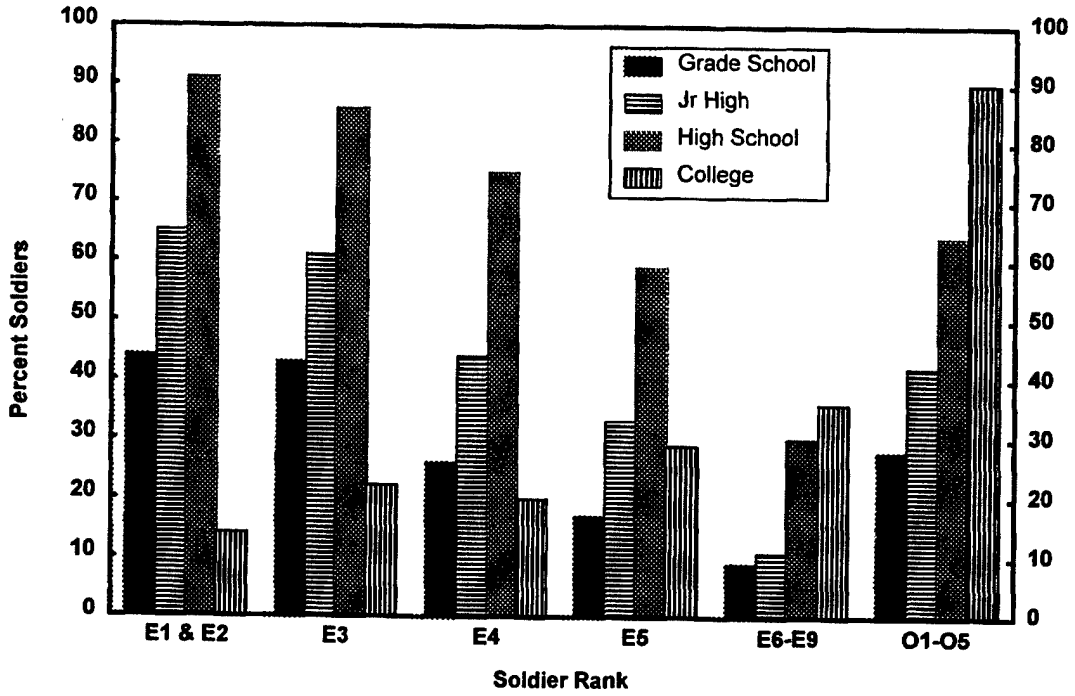

Figure 2. Percentage of soldiers using a computer in school, displayed by rank.

Another analysis was conducted for the entire sample to provide an overall picture of the relationship between age and the use of computers in high school. For the youngest soldiers, those 24 years or younger, 80% or more had used computers in high school[2]. It was estimated that these soldiers were in high school from 1994 to 2000. For those soldiers aged 25 to 34, on average 50% had used computers in high school. These soldiers were in high school from 1984 to 1993. For the soldier aged 35 to 50, only 15% had used computers in high school. These soldiers were in high school from 1968 to 1983. No individual over age 38 had used a computer in high school. These results provide another illustration of how the availability of computers in schools has changed over time.

Examination of educational settings by battalion element (Figure 3) showed fewer differences across the groups. The ANOVA on the mean number of educational settings with the battalion elements was not significant (see Table A-7). However, the trend for the computer use in high school was similar to the FY00 FORSCOM survey (Fober et al., 2001). Again, the battalion staff group had the lowest percentage (58%, see Figure 4). Computer use in high school, from high to low for the other groups was as follows: Engineers (77%), Field Artillery (73%), Infantry (71%), and Medics (61%). These percentages were also similar to the F00 survey.

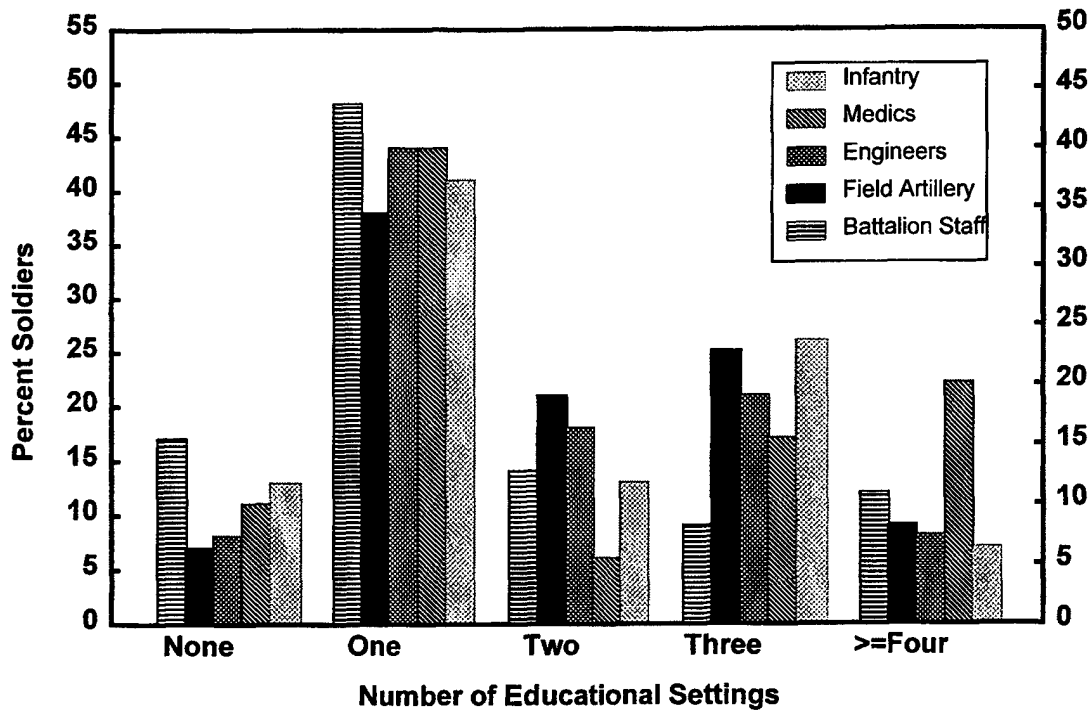

Figure 3. Number of educational settings where a computer was used, displayed by battalion element.

[2] Age 17 was used to estimate the year in which soldiers were in high school.

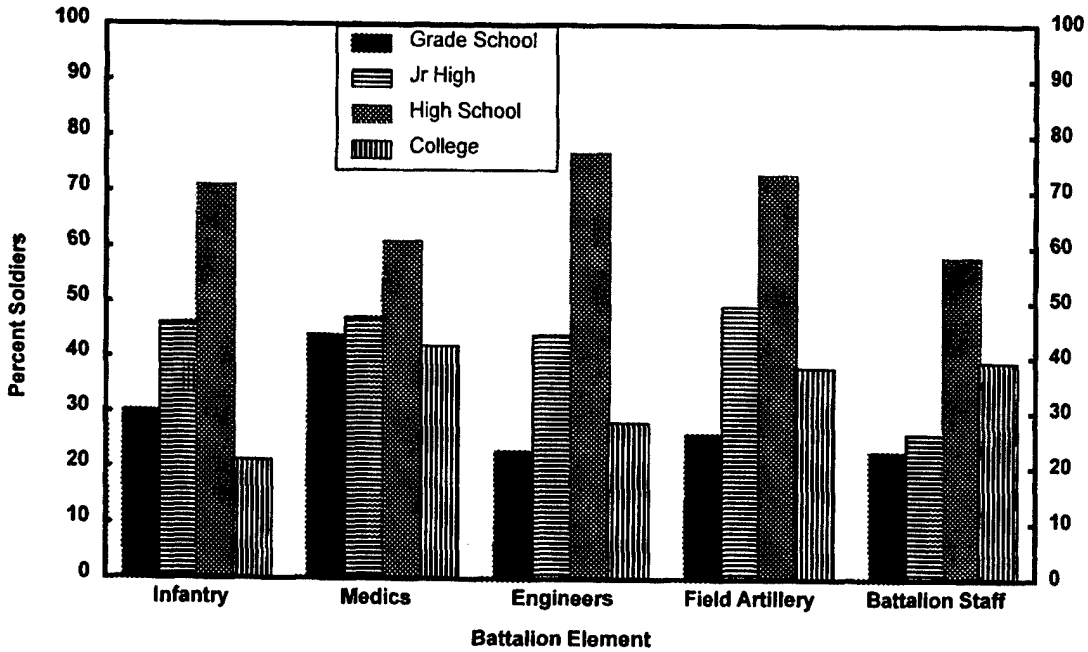

Figure 4. Percentage of soldiers using a computer in school, displayed by battalion element.

Computer ownership and computer use. Another key question concerning computer use was whether soldiers owned a computer. Computer ownership can depend on many factors and the ability to afford a computer might be a primary one. There was a significant difference among different ranks, $F(5, 637) = 30.36, p < .000$. Post hoc comparisons showed that the E1-E2 group owned significantly fewer computers than all groups except for the E3 group. In addition, the officers owned significantly more computers than all groups except for the senior NCOs (i.e., E6-E9 group). As shown in Figure 5, the computer ownership percentages were 31% for the junior enlisted ranks (E1s and E2s), 43% for E3s, 48% for E4s, 72% for E5s, 87% for the senior NCOs (E6-E9 group), and 96% for the officers. In other words, computer ownership increased as the rank increased.

We also asked whether soldiers currently use a computer. The response was high for all soldiers. However there was a significant different among the ranks, $F(4, 590) = 5.01, p < .001$. This analysis was conducted without officers as all officers said they used a computer (Figure 5). Post hoc comparisons showed that more of the senior NCOs (95%) used computers than soldiers at the ranks of E1-E2 (73%) and E3 (78%). The percentage of soldiers currently using a computer increased as their ranks increased (see Figure 5 and Table A-10).

Figure 5 also illustrates that, for each rank, the percentage of soldiers using a computer was higher than the percentage owning a computer. This difference was greatest for the lowest

ranking soldiers. Less than half the soldiers at or below the rank of E4 owned a computer. Yet at least 73% of these soldiers indicated they used a computer, typically at home or in the barracks (see Tables A-10 and A-11).

The most common place to use a computer was at home (Figure 5). However for senior NCOs and officers, the workplace was just as common. From Figure 5, it is also clear that the lowest ranking soldiers (E4 and below) did not typically use a computer in their units, but the percentage greatly increased for those at the rank of E5 and above. Soldiers were also asked about computer use in training facilities. Because these percentages were low and similar across ranks, they were not included in Figure 5, but are in Tables A-10 and A-11.

For the battalion elements, computer ownership did not vary as greatly as ownership across rank (see Figure 6). There was a significant difference among battalion elements with regard to computer ownership, $F(4, 639) = 6.37, p < .000$. The post hoc comparisons showed that the Infantry soldiers owned significantly fewer computers than the staff and Field Artillery soldiers. At least 66% of Field Artillery and 78% of the staff members[3] reported owning computers, while only 50% of the Infantry owned computers. Ownership percentages for Engineers and Medics were 54%, and 58% respectively (see also Table A-11).

Overall computer usage was high in each battalion element. Infantry was the lowest, with 77% reporting using a computer, and the Infantry percentage was significantly lower than the staff members and Field Artillery (more than 90%), $F(4, 641) = 5.76, p < .000$. Where soldiers used a computer varied greatly by battalion element (see Figure 6). The most common place to use a computer was at home. However, 77% of the battalion staff used a computer in their unit. This high rate is consistent with the responsibilities of their duty positions. Work/unit computer usage percentages were lower for the other groups (53% for Medics, 46% for Field Artillery, 36% for Engineers, and 19% for Infantry).

[3] Of the battalion staff personnel 60% were Infantry, 22% field artillery, and 18% from other branches (primarily chemical, military intelligence, quartermaster, and signal).

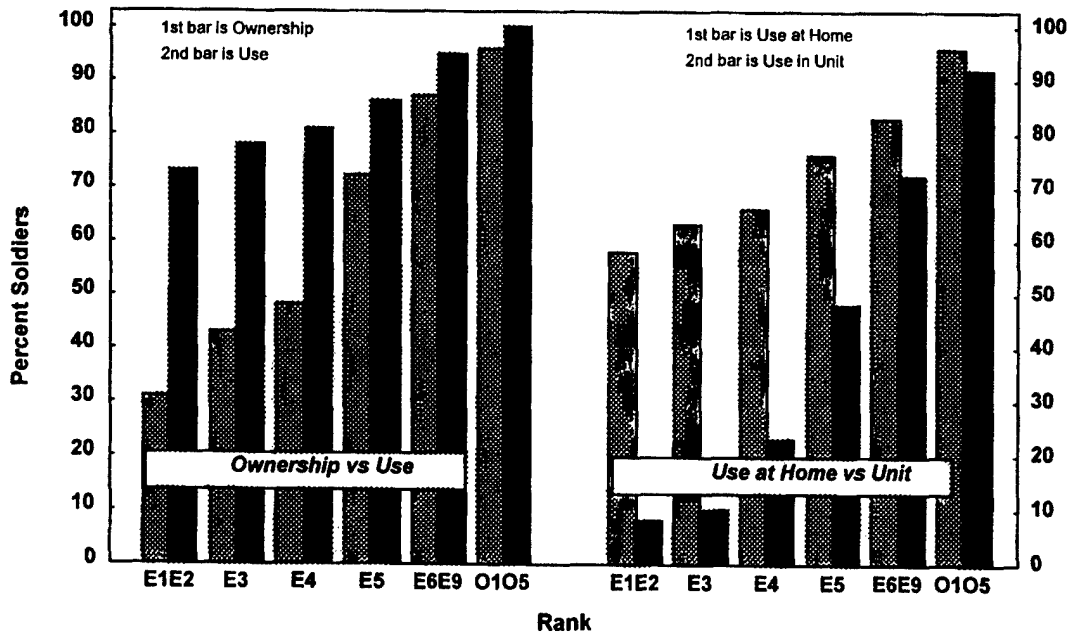

Figure 5. Computer ownership and use, and home and unit use displayed by rank.

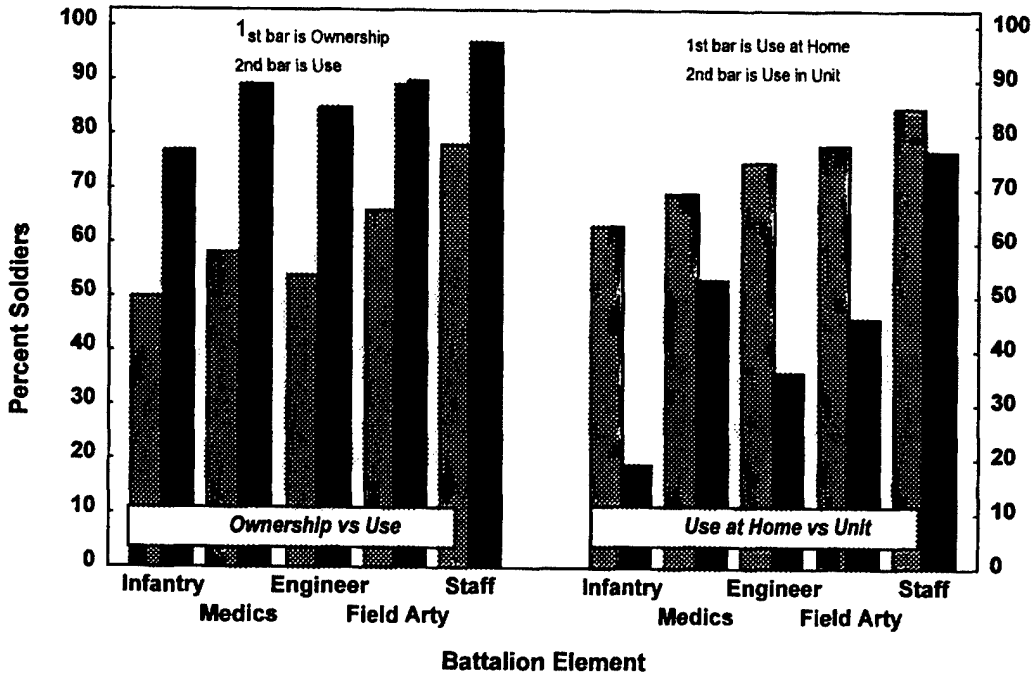

Figure 6. Computer ownership and use, and home and unit use displayed by battalion element.

Subjective Indices of Computer Skill and Expertise

The survey provided several subjective indices of computer skill: the frequency with which different software features were used, self-ratings of expertise with computer software, use of specific software packages, and self-ratings of typing skill. Typing skill is not a direct index of computer skill, but soldiers who can type are less likely to be intimated by a computer keyboard.

Typing skill. The mean ratings of typing skill by soldier rank differed significantly, $F(5, 639) = 5.73, p < .000$. Post hoc comparisons showed that the officers perceived their typing skills as being better than all the other groups. In fact, only 2% of the officers indicated they had limited typing skill as compared to 11% to 17% for the other soldier ranks. Conversely, 42% of the officers rated themselves as being able to type quickly compared to 15% to 28% for the other soldier ranks (see Table A-12).

The mean ratings of typing skill by battalion elements did not differ significantly (see Table A-13). The battalion elements were similar to each other at all skill levels. Overall, no more than 16% of the battalion elements indicated they had limited typing skills; that is, they could only hunt and peck slowly at a keyboard (see Table A-13). On the other hand, across all battalion elements 18% to 31% of the soldiers said they could type quickly.

Computer features. Soldiers were asked how frequently they used seven common computer features: mouse, games, software with icons, software with menus, graphics, e-mail, and the Internet. The frequency scale had five points ranging from daily, weekly, monthly, less than monthly, to never (see survey in Appendix C). From the highest to the lowest usage, the features ordered as follows, mouse, Internet, e-mail, menus, icons, games, and graphics. Compared to the surveys conducted before FY00 (Dyer & Martin, 1999; Fober et al., 2000), it appears that Internet and e-mail use are increasing more rapidly than other computer features, a trend consistent with the surveys conducted in or after FY00 (Fober et al., 2001; Singh & Dyer, 2001).

A 6 x 7 ANOVA (soldier rank by computer features with repeated measures on the last factor) was conducted on the frequency of use ratings. The result of this analysis revealed a significant main effect for soldier rank, $F(5, 634) = 12.82, p < .000$, a significant main effect for features, $F(6, 634) = 193.25, p < .000$, and it was further qualified by a significant interaction, $F(30, 3804) = 8.33, p < .000$. Figure 7 reflects the trends from this analysis. The officers and the senior NCOs had the highest usage for all features except games. This finding is consistent with the earlier survey findings. The means and standard deviations for the frequency of using computer features, displayed by soldier rank, are in Table A-16.

As reflected in the interaction shown in Figure 7, the soldier ranks generally ordered in accordance with the rank main effect on mouse, Internet, e-mail, menus, and icon features. However, these orders shifted for games, the officers were lowest on games as compared to other ranks.

When battalion elements were examined, the main effect for features was repeated, $F(6, 636) = 116.98, p < .000$ (Figure 8, also see Table A-17 for means). There was a significant main effects for battalion element as well, $F(4, 636) = 11.10, p < .00$, and a significant interaction, $F(24, 3816) = 3.24, p < .000$. Except for games, staff members rated themselves as using all of the features more often than the other battalion elements. Infantry had the lowest frequency of use for all features.

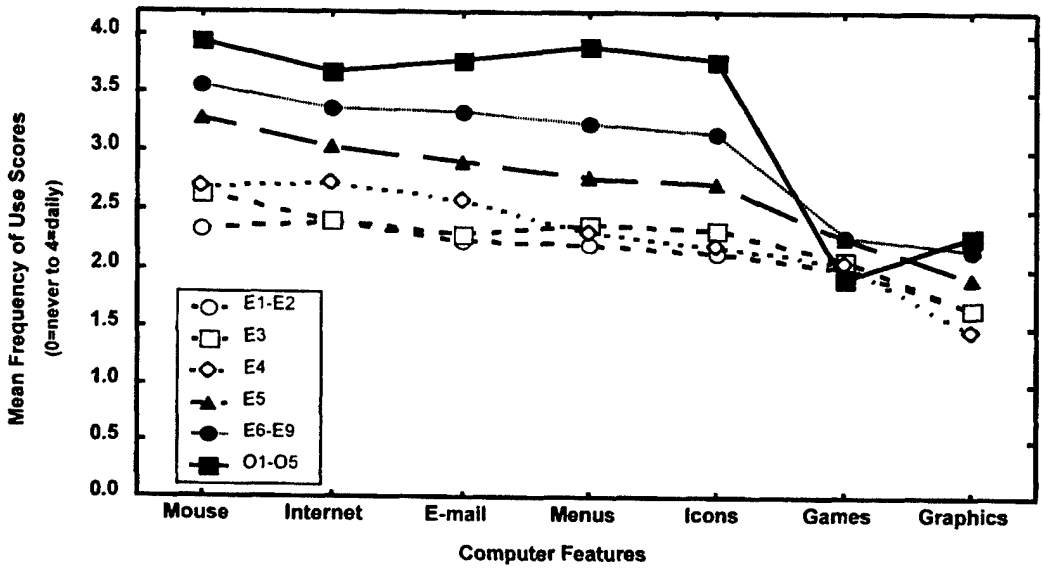

Figure 7. Interaction between soldier rank and use of computer features.

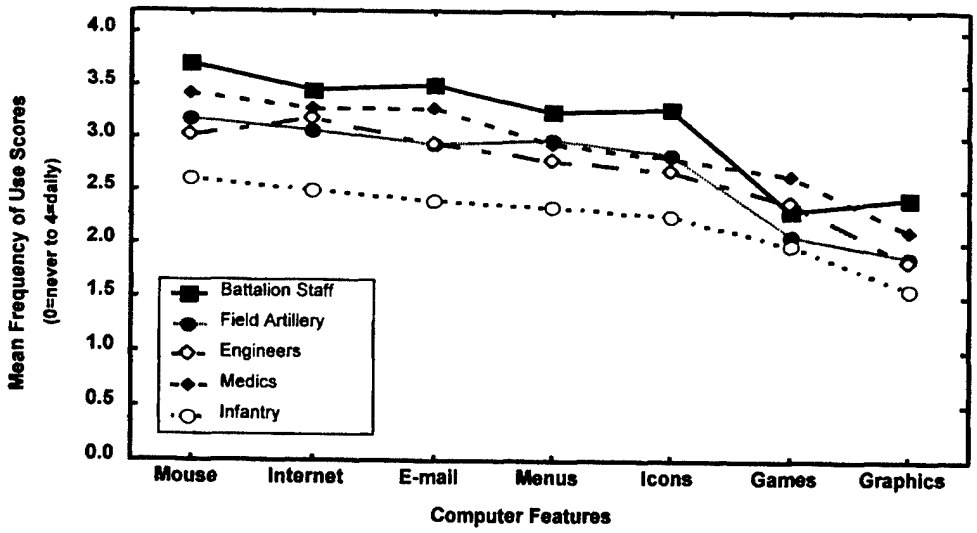

Figure 8. Interaction between battalion element and use of computer features.

Self-ratings of skill. A six-point, self-rating scale asked soldiers to evaluate whether they were computer novices, good with one software application package, good with several software packages, could program in one language, could program in several languages, or good enough for Bill Gates to hire them (i.e., an expert). Soldiers' ratings of their computer skill by rank are illustrated in Figure 9. The mean ratings for the ranks were statistically different, $F(5, 638) = 5.85$, $p < .000$. Post hoc comparisons showed that the officers rated themselves higher than each of the enlisted groups (Table A-22).

The percentage of soldiers in each rating category clarifies the differences in the mean ratings between the officers and the other groups (Table A-20). The percentage of novice ratings decreased from enlisted soldiers to officers, as delineated in Figure 9. The novice percentages were 46% for the junior enlisted ranks (E1s and E2s), 39% for E3s, 48% for E4s, 40% for E5s, 38% for the senior NCOs, and only 8% for the officers. In contrast, 58% of the officers rated themselves good with several software programs. The corresponding percentages for the other groups (i.e., good with several software programs) ranged from 29% to 38%. Figure 9 shows that the officers had the greatest percentage of individuals with programming skills.

Self-ratings of computer skills by battalion element are illustrated in Figure 10. The mean ratings for the battalion elements were statistically different, $F(4, 640) = 3.81, p < .005$. Post hoc analysis showed that the battalion staff ($M = 2.52$) rated themselves significantly higher than the Infantry soldiers ($M = 2.04$) (see Table A-23 for descriptive statistics). The mean for the Medics ($M = 2.44$) was similar to the battalion staff, but not significantly higher than the Infantry soldier rating. This lack of a significant difference is probably the result of the small sample size for Medics, as the profiles for the Medics and battalion staff were quite similar. For example, the Medics had the fewest percentage of novices (28%), next was battalion staff (29%), then Field Artillery (31%), Engineers (43%), and Infantry with the highest percentage (47%). In addition, the battalion staff had the highest percentage of soldiers who were skilled with at least several software programs (60%), followed by Medics (58%), then Field Artillery (50%), Engineers (43%), and Infantry (40%). Table A-21 presents all the rating percentages.

Soldiers' free-response answers to what software programs they use and their programming skills also provided insight into their computer skill and experience. With regard to software programs, novices should not have listed any software package. Only 14 of the 262 soldiers who considered themselves novices answered the software question. Tables A-32 and A-33 provide percentages for all soldiers (i.e., novices and non-novices).

In general, about 39% of the non-novice soldiers named general office software; that is, word processing, spreadsheet, graphics, and/or some type of operating system (see Table A-35). Within these categories, Microsoft Office products predominated (see Table A-36). Except for graphics, at least 86% of those who listed software in these categories cited a Microsoft Office product (e.g., Word, Excel, Microsoft Office, Microsoft Works). For instance, 99% of the soldiers used Microsoft Excel for the spreadsheet software. These specific software percentages were fairly consistent across battalion elements.

The second software question addressed the programming languages soldiers used. Only 64 soldiers had programming skills, and only 50% responded by listing specific programming

languages (see Table A-37). The most commonly listed programming languages were BASIC and C++ (see Table A-38).

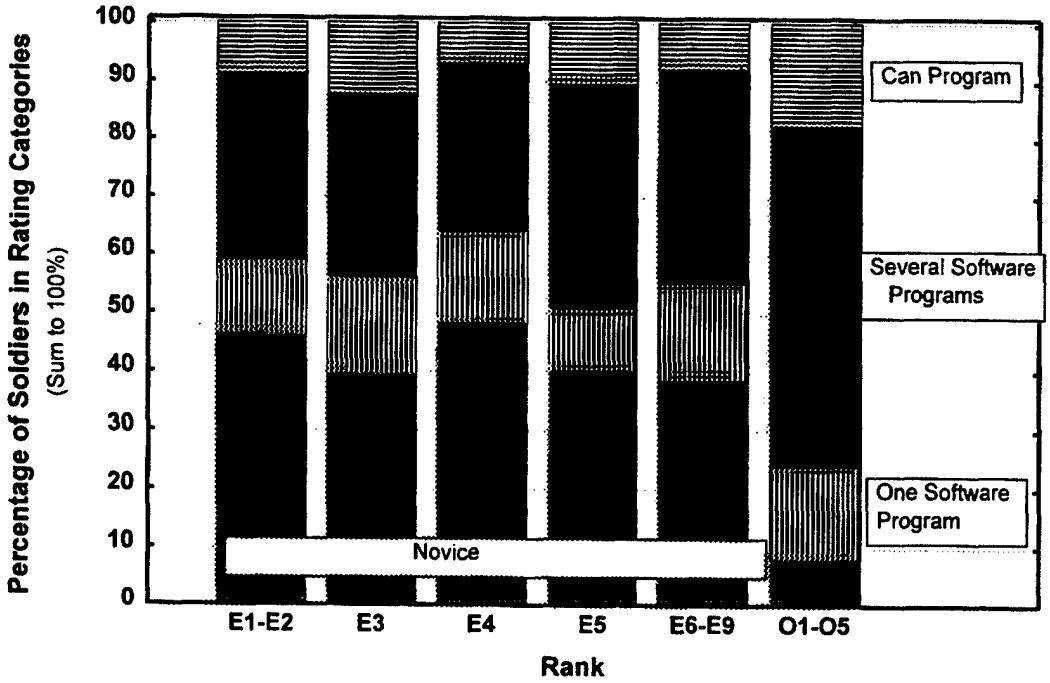

Figure 9. Self-ratings of computer skill displayed by rank.

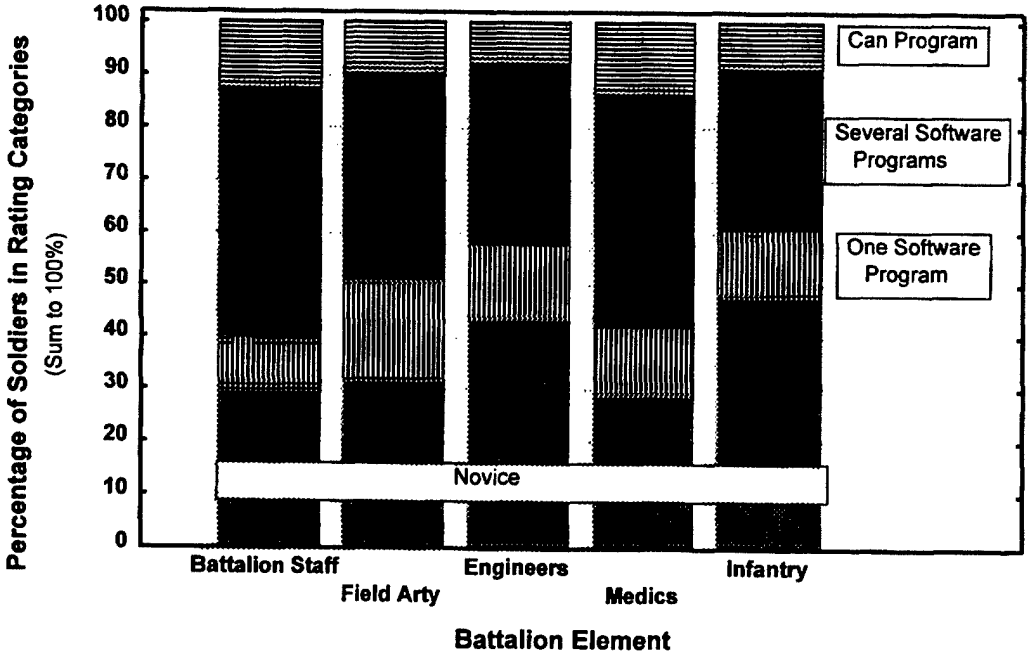

Figure 10. Self-ratings of computer skill displayed by battalion element.

Icon Test Scores

Besides the subjective ratings of skill, the soldiers were compared on the icon test. The test presented a scanned image of 18 commonly used, Window-based, icons (see survey in Appendix C). Soldiers had to write-in the function of the icon. Soldiers, who typically rely on the physical layout of software toolbars to recognize icons, may have found this out-of-context test format somewhat difficult. The icon test was an objective measure or index of computer experience and expertise, and provided a "check" on the subjective items in the survey. The test was not intended to be a comprehensive assessment of software skill and knowledge, but simply an index of soldiers' general knowledge of common commercial software applications.

A coding scheme was developed for scoring the icon responses (see Appendix D). Some latitude was given to scoring answers, as the icons have slightly different meanings within various software programs (e.g., word processing and the internet). The inter-rater reliability was checked formally on three separate occasions. Dyer and Martin (1999) reported an inter-rater reliability of 98% for an earlier coding format, which was revised for later studies. Using the revised format, Fober et al. (2000) and Singh and Dyer (2001) reported an inter-rater reliability of 95% and 96% respectively. The inter-rater reliability was not determined in the present study because the same raters scored this study as in Singh and Dyer.

The icon score results reflected the self-reported expertise indicated by the other survey measures. Figure 11 is a box plot of the icon scores by rank, illustrating the diversity of the scores as well as where the scores were concentrated. Significant differences in the mean icon scores occurred among the soldier ranks, $F(5, 634) = 15.70, p < .000$. Post hoc comparisons revealed that the officers and senior NCOs scored significantly higher than each of the other ranks. The groups ordered from high to low as follows: officers ($M = 12.48$), E6-E9 ($M = 10.98$), E5 ($M = 9.35$), E3 ($M = 8.90$), E1-E2 ($M = 8.34$), and E4 ($M = 8.04$). Complete descriptive statistics are in Table A-24. Figure 11 also illustrates less diversity of scores for the officer sample than the other groups. The general finding that icon scores increased as rank increased is consistent with the earlier survey findings of Infantry courses and FORSCOM units.

When the icon scores were analyzed by battalion element, the staff members ($M = 11.30$) had the highest scores, and they scored significantly higher than the Infantry ($M = 8.63$), $F(4, 636) = 6.87, p < .000$. The other groups ordered from highest to lowest as follows: Field Artillery ($M = 9.61$), Engineers ($M = 9.37$), and Medics ($M = 9.37$). Figure 12 illustrates this order and the spread within the groups. Descriptive statistics are in Table A-25.

The individual icons differed in difficulty for all soldiers, ranging from a high of 89% correct for the recycle icon to a low of 2% correct for the arrow icon. The percentage of soldiers who identified each icon correctly was also determined (see Tables A-26, A-27, A-28). The icons were classified by three levels of difficulty; that is, easy, intermediate, and hard. The easiest icons, at least 75% correct, were recycle, cut, spell check, and print. The hardest items, less than 25% correct, were fill, paste, new file, group, and draw arrow. Nine icons were of intermediate difficulty: open file, help, zoom, save, close, cursor, center, copy, and undo. The officers, senior NCOs, and the staff members scored highest on most icons, specifically the

difficult ones, as compared to other ranks and battalion elements. This is consistent with the main effects on icon scores cited previously.

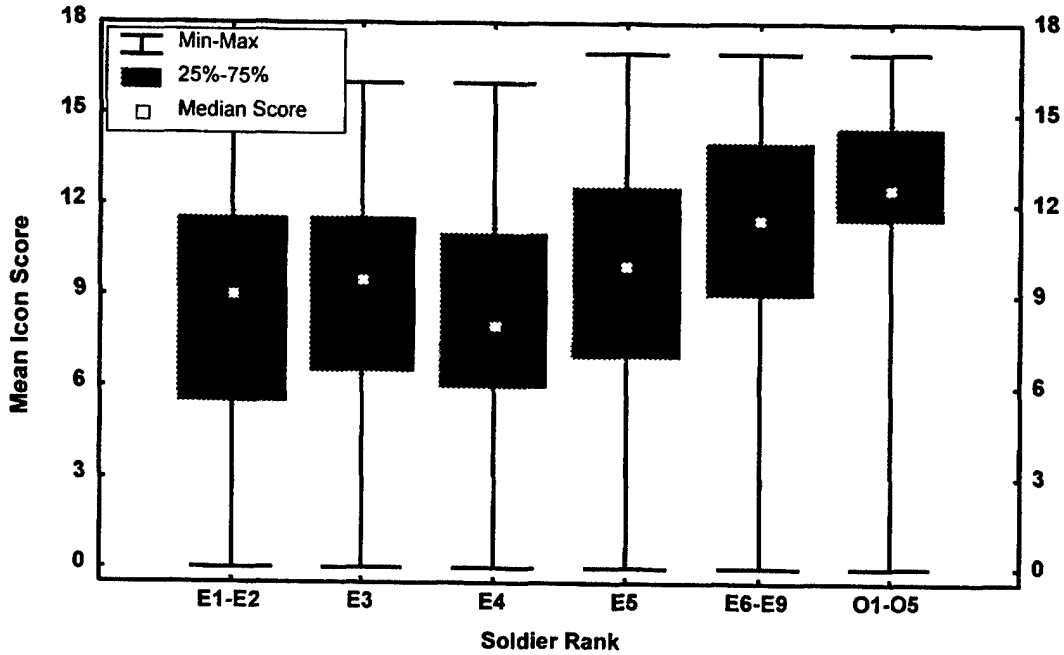

Figure 11. Icon scores displayed by soldier rank.

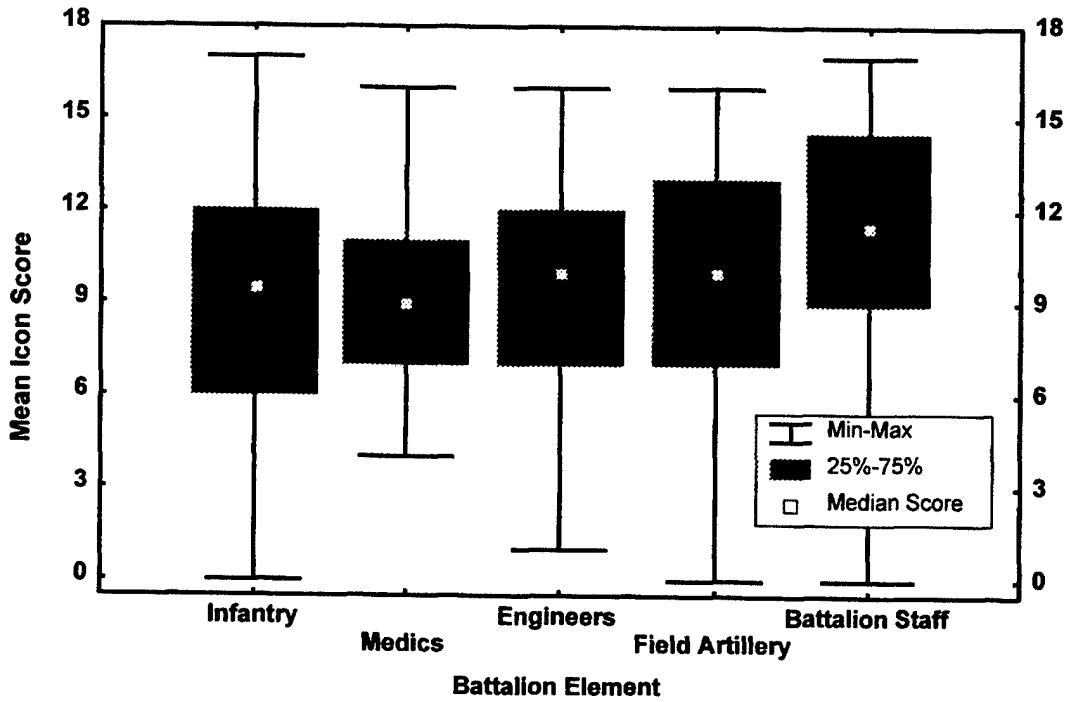

Figure 12. Icon scores displayed by battalion element.

Relationships Among Indices of Computer Skill

A question of interest was whether the survey measures that assessed computer backgrounds related to the icon test scores. Across all soldiers, the frequency of using common computer features correlated most highly with the icon scores, $r = .51$ (see Table 2, All Soldiers column). As shown in Table 2, four other variables had significant correlations with the icon score: self-rating, owning a computer, using a computer, and number of educational settings where a computer was used. In general, the relationships that occurred for the entire sample were typical of each battalion element and rank, except for the officers (Tables 2 and 3). The low correlations for the officers may reflect the homogeneous nature of this group. Most officers owned computers, had easy access to computers, and used them regularly. Similar relationships occurred between the self-ratings and the background variables (Tables A-30 and A-31).

Table 2
Correlations With Icon Test Scores by Battalion Element

Variable	Battalion Element					
	Battalion Staff (n =66)	Field Artillery (n = 128)	Engineers (n = 61)	Medics (n = 36)	Infantry (n = 355)	All Soldiers (n=646)
Use of Computer Features (Sum)[a]	.59**	.57**	.43**	.35*	.48**	.51**
Self-Rating	.50**	.44**	.30*	.27	.44**	.44**
Own a Computer	.43**	.35**	.38**	.37*	.35**	.38**
Use a Computer	.33**	.35**	.34**	.27	.31**	.34**
# Education Settings Where Used a Computer	.22	.21*	.01	.00	.22*	.18**

[a] The sum of ratings for the seven frequency of feature use items (e.g., menus, e-mail, graphics).
* $p < .05$, ** $p < .01$.

Table 3
Correlations With Icon Test Scores by Rank

Variable	Soldier Rank					
	E1-E2 (n =130)	E3 (n = 105)	E4 (n = 162)	E5 (n = 111)	E6-E9 (n = 87)	O1-O6 (n=50)
Use of Computer Features (Sum)	.31**	.41**	.58**	.49**	.69**	.07
Self-Rating	.48**	.29**	.40**	.48**	.51**	.24
Own a Computer	.28**	.32**	.32**	.27**	.38**	.03
Use a Computer	.27**	.34**	.30**	.26**	.53**	*A*
# Education Settings Where Used a Computer	.26**	.25**	.28**	.24*	.39**	-.19

[a] No correlation was possible because all individuals reported using a computer.
* $p < .05$, ** $p < .01$.

Results for the Specialists in Each Battalion Element

The battalion staff members rated themselves higher and scored higher on the icon score than the other battalion elements, which is consistent with the FY00 FORSCOM survey (Fober et al., 2001). However, age, rank, and other possible factors were not controlled for in that analysis. As acknowledged, by not controlling the aforementioned factors there was a confounding between the rank and battalion element variables. For example, the battalion staff in the FY01 survey reported here had proportionately more officers and sergeants at all ranks compared to other battalion elements.

In the FY00 FORSCOM survey, Fober et al. (2001) controlled age and rank in examining the indices of computer expertise across battalion elements by using only one rank, that of specialist/corporal (E4). This analysis was possible because of the large number of specialists overall, and the relatively large numbers within each battalion element. In comparing specialists in the battalion elements, Fober et al. found no differences in mean age, in computer ownership, and in use of computers at home. However, there were differences in general usage rates, use of computers at work, frequency of using computer features, self-ratings, and icon scores. Specialists in the battalion staff were consistently higher on these measures than specialists within Infantry companies. The differences were attributed to the opportunity afforded to specialists within the battalion staff to use computers at work, thereby leading to a high frequency of using a variety of computer features, higher self-ratings, and higher icon scores.

A similar analytic approach was applied in the present research to determine if the FY00 results would be repeated. As in FY00 specialists were the largest group, but the numbers within some battalion elements were relatively small (Tables 1 and 4). A major difference between the two surveys was that in FY00 specialists constituted 31% of the battalion staff sample. In FY01, they constituted 20%. Even though inferential statistics were applied to most variables, the results are best viewed as trends.

Participants

The Infantry had the largest numbers of specialists as compared to Field Artillery, Engineers, Medics, and battalion staff (see Table 4). There was a significant difference in the ages of the specialists in the various battalion elements, $F(4, 156) = 2.77, p < .05$. Post hoc comparisons showed that the Battalion staff specialists' age was significant higher than the average age of the other specialists[4].

Computer Use and Expertise

Comparisons of specialists within the battalion elements were made on the computer ownership, usage, and expertise variables. Descriptive statistics on these measures are in Tables B-1 through B-12.

[4] The Scheffe method for multiple comparisons was used here as it provided a means of testing a complex contrast of more than two means.

No significant differences were found on the number of educational settings in which they had used computers, the percentage who own a computer now, the percentage who currently use a computer, and the percentage who use a computer at home. The only significant difference was on the percentage of specialists who use a computer at work, $F(4, 157), = 8.39, p < .000$. Post hoc comparisons showed that a higher percentage of specialists in the battalion staff (61%) and Medics (57%) used computers at work as compared to the Infantry (10%) specialists' (see Figure 13).

Table 4
Descriptive Statistics on Age of Specialists by Battalion Element

Element	*N*	*M*	*Mdn*	*SD*	Min & Max Values
Battalion Staff	13	26.08	25	4.68	21-34
Field Artillery	24	23.38	22	2.97	19-31
Engineers	23	23.00	22	2.47	20-29
Medics	13	23.08	22	2.62	21-29
Infantry	88	23.31	23	2.82	19-32

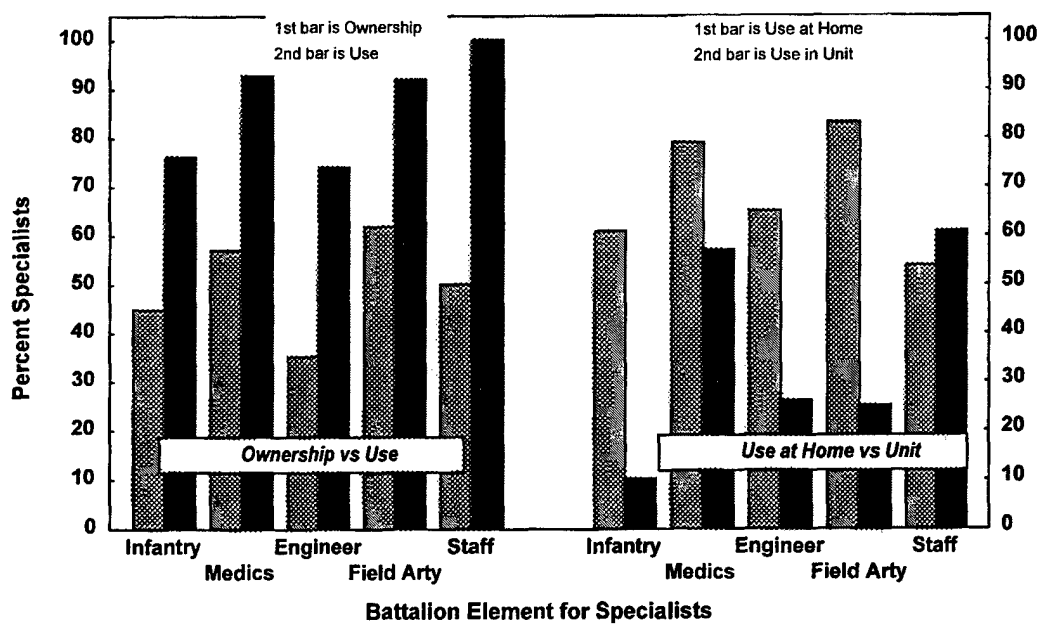

Figure 13. Computer ownership and use, and home and unit use for specialists.

Of interest was whether the higher percentage of specialists who used computers at work in the staff and Medic positions would translate into higher indices of computer skill. But there were no significant differences among the groups on the self-ratings, frequency of use ratings, and icon scores. These findings were not consistent with the FY00 FORSCOM survey (Fober et al., 2001), which found significant differences on each of these variables.

Despite the lack of significant differences, in many ways the data showed trends similar to, but not as strong, as the FY00 FORSCOM survey. The rank orders of the battalion elements on the key computer indices are presented in Table 5 (1=first and 5=last). Infantry specialists were either last or second last on all the computer indices, whereas specialists in the battalion staff and Medics were either first or second on most of the computer indices.

Table 5
Rank Order of Specialists on Key Computer Indices

	Key Computer Indices						
		Computer Usage			Subjective and Objectives Indices of Skill		
Battalion Element	Own Computer	Use Currently	Use in Unit	Frequency of Using Features	Self-Ratings	Least % of Novices	Icon Score
Battalion Staff	3	**1**	**1**	**2**	**1**	**2**	3
Medics	**2**	2.5	**2**	**1**	**2**	**1**	**1**
Field Artillery	**1**	2.5	3.5	4	3	3	**5**
Engineers	**5**	**5**	3.5	3	**5**	4.5	**2**
Infantry	4	4	**5**	**5**	4	4.5	4

Note. Tied ranks were assigned when % were equal or within 1% of each other.

In addition, the software and computer programming experience of specialists in Infantry positions was more limited than specialists in other battalion elements. Of those who rated themselves as non-novices, specialists in staff positions were more likely to list spreadsheet software package (see Table B-11), and the Engineer specialists were the most likely to list word processing and graphics software. The specialists in staff and Medic positions were more likely to cite programming experience 8% and 7%, respectively. In contrast, only 0% to 4% of the specialists in the Infantry, Engineers, and Field Artillery listed any kind of programming experience (Table B-12).

Summary

The results from the present research are relatively consistent with the FY00 FORSCOM survey (Fober et al., 2001). Additionally, these findings reinforce the findings from the Infantry School professional development courses (Dyer & Martin, 1999; Fober et al., 2000; Singh & Dyer, 2001). The picture of the soldiers' computer backgrounds, self-perceptions of skill, and an objective index of skill/knowledge is similar in all five surveys. The greater the computer background and use, the higher the soldiers' perceptions of their skill and the higher their scores on the objective icon test. Moreover, as rank increased, computer proficiency, computer ownership, and use of computers increased. The officer group scored the highest on the icon test, as was the case in the prior four surveys. Furthermore, the findings are consistent with the relatively rapid increase in the availability of personal computers in American society.

The findings of the present study do not support the assumptions that senior NCOs have poor computer skills, and that all of today's youth are computer literate. This erroneous postulation is probably based on the assumption that just by providing abundant hardware and software in school will lead to improved computer skills. Cuban, Kirkpatrick, and Peck (2001), found that the easy access to equipment and software in school did not necessarily lead to widespread computer use by students or teachers. Furthermore, they found that when high school students use computers, they primarily use them for word processing and Internet searches. Cuban et al. did identify some students who were computer experts, but most of them indicated they gained their computer expertise outside of school, usually on home computers. Given these findings, it is not surprising that today's youth joining the Army are not as computer savvy as many would like to believe.

The survey findings reflect the increased availability in computers in American schools. Cuban et al. (2001) stated that "After almost two decades of intense promotion of information technology by business leaders, policy makers, and parents, most teachers and students now have far more access to machines and software both in school and at home than ever before" (p. 815). The FORSCOM sample had soldiers who ranged in age from 17 to 50. The percentage of soldiers using computers in high school was inversely related to their age. For those soldiers in high school from 1994 to 2000, at least 80% used a computer in school. At the other extreme, for those soldiers in high school from 1968 to 1983, only 15% used a computer. Furthermore, no one over the age of 38 in the sample had used a computer in high school.

The higher ranking and older NCOs and officers did not gain their computer expertise in high school. Almost all the officers used computers in college, and it is probably safe to assume that this experience was more extensive than their high school experience, if they had computers in high school. In addition, almost all officers owned computer and almost all used computers both at home and at work. The picture is very similar for the senior NCOs (E6-E9), except that percentage using computers in college was one-third that of the officers. It appears that most of the senior NCOs gained their computer expertise on their own.

In addition, the FY01 survey results, like the prior surveys, found that the highest correlates with the self-ratings and icon scores were the extent to which soldiers used a variety of computer features on a regular basis. The highest correlates were not computer ownership, nor exposure to computers in the public schools.

With respect to Army branch or battalion element, the general picture was that the battalion staff members had the most computer expertise, and the Infantry soldiers had the least. This picture is qualified, however, by the fact that not all ranks were equally distributed across these elements (e.g., more officers in the battalion staff sample; more privates, private first class, and specialist/corporals in the Infantry sample). In addition, four times as many staff members used computers in the unit as compared to the Infantrymen in the rifle companies. The computer backgrounds and expertise of Field Artillery, Medical Service, and Engineer soldiers were typically between the battalion staff and the Infantry. However, on various measures, one of these groups would be very similar to the battalion staff. These findings are consistent with the FY00 FORSCOM survey (Fober et al., 2001).

The analysis of the soldiers at the rank of specialist controlled for rank, but was limited due to the substantial variation in sample size across the battalion elements. The general trend, however, was for specialists in the battalion staff and medic positions to be higher on the indices of computer use and expertise than the specialists within the Infantry company. The FY00 FORSCOM survey (Fober et al., 2001) showed consistent differences between the battalion staff and Infantry specialists on the computer use and expertise measures. Thus the FY01 results agree with these prior findings but do not replicate them on all measures.

The results of this survey indicate a diverse population of soldiers, one that has individuals with limited computer skills to individuals with programming skills. Because of this diversity, any training on digital systems must be flexible enough to train individuals from both ends of the spectrum. If the present findings remain stable, many soldiers would benefit from basic computer training prior to learning to computer subsystems within tactical systems such as the Land Warrior and the Bradley Fighting Vehicle A3.

The survey results also indicate that a substantial portion of the population sampled has limited computer expertise. Also, the relationships among use of computer features, self-ratings, and the icon test scores are strong. This converging evidence points to the need to train basic computer skills for some segments of the Army population. The findings do not mean that soldiers cannot learn new digital systems without strong computer backgrounds, but that basic computer skills should facilitate the learning of those systems. In the case of the Land Warrior, much of the software is accessed via icons in a Windows-based environment. Obviously, extensive experience with Windows should accelerate training and mastery of Land Warrior computer functions.

The present survey and the prior FORSCOM survey also indicate that the type of opportunity provided to soldiers to use computers may play an important role in learning basic computer skills. That is, although overall use of computers at home was high for all soldiers, the battalion staff soldiers with high use in a work environment as well scored higher on both subjective and objective measures of computer expertise than Infantry soldiers with lower use in a work environment. The skills required by the Army's digital systems might be most effectively trained by providing soldiers with some of the basic computer skills to get started, and then afford them the opportunity to practice those skills. The need for a total force with computer skills is growing with the increase in systems requiring computer expertise. Taking simple measures to identify soldiers with limited computer skills and to provide them basic computer training before their specialized training will pay off in the future.

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Appendix A

Data Tables for All Soldiers

Table A-1
Number of Soldiers by Each Rank in Each Battalion Element

Rank	Battalion Element					
	Battalion Staff	Field Artillery	Engineers	Medics	Infantry	All Elements
Private	4	26	7	10	83	130
Private 1st Class	5	22	8	3	67	105
Specialist/Corporal	13	24	23	14	88	162
Sergeant	15	18	10	3	65	111
Staff Sergeant	11	21	9	2	34	77
Sergeant 1st Class	1	1	0	1	4	7
First Sergeant	1	0	0	0	1	2
Sergeant Major	1	0	0	0	0	1
2d Lieutenant	2	7	2	2	5	18
1st Lieutenant	0	7	2	1	5	15
Captain	8	2	0	0	2	12
Major	4	0	0	0	0	4
Lieutenant Colonel	1	0	0	0	0	1

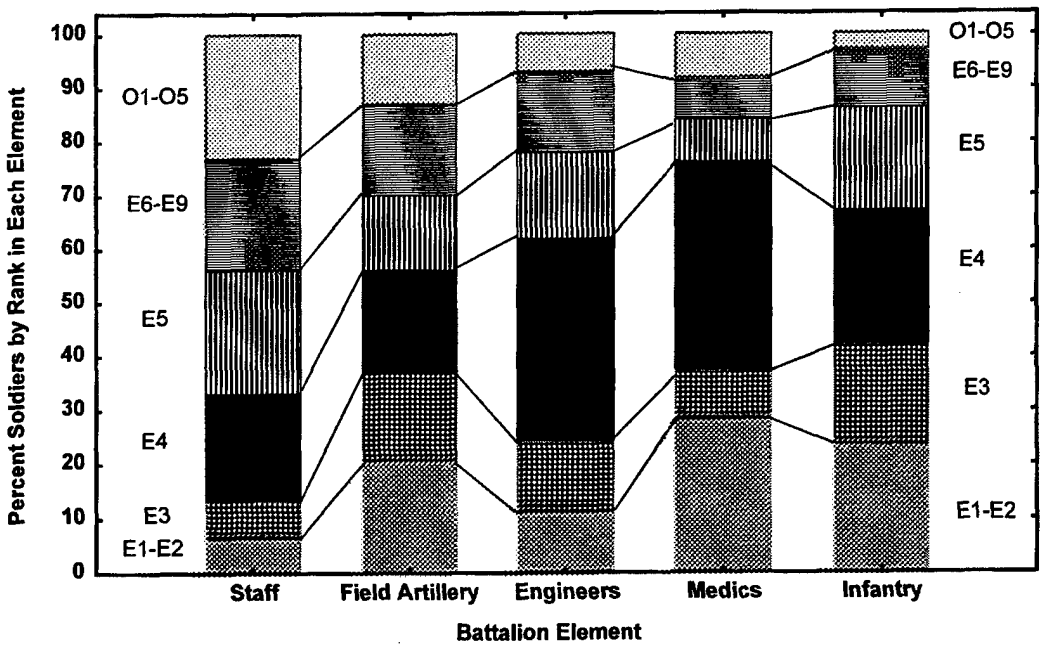


Figure A-1. Relative distribution of ranks in each battalion element.

Table A-2
Descriptive Statistics on Age in Years by Rank

Rank	*N*	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
E1-E2	128	20.44	20	2.45	17-31	19-21
E3	105	21.06	20	2.33	18-31	20-22
E4	161	23.48	23	3.03	19-34	21-25
E5	110	26.45	26	3.92	20-42	24-29
E6-E9	87	32.30	32	4.72	23-50	29-35
O1-O5	50	27.60	26	5.39	22-43	24-29

Note. $F(5,635) = 157.49, p < .0001$. The ages of all groups differed except those with ranks of E1-E2 and E3, and the officers and those with a rank of E5.

Table A-3
Descriptive Statistics on Age by Battalion Element

Battalion Element	*N*	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
Battalion Staff	66	29.29	28	7.03	20-50	23-35
Field Artillery	128	24.12	23	4.91	18-43	20-27
Engineers	61	24.05	23	3.81	18-36	21-27
Medics	35	24.91	23	6.00	18-44	21-27
Infantry	352	23.80	23	4.61	17-42	20-26

Note. $F(4,637) = 17.33, p < .0001$. The staff members were older than each of the other groups.

Table A-4
Descriptive Statistics on Months Served in the Army by Rank

Rank	*N*	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
E1-E2	129	11.88	10	7.11	4-55	8-13.50
E3	103	19.53	18	9.57	5-56	14-21
E4	161	41.17	34	20.53	9-120	28.5-47
E5	110	73.03	65	31.53	27-179	50-92
E6-E9	87	145.25	140	47.42	52-270	107-177
O1-O5	50	59.12	36	60.68	9-244	15.5-74

Table A-5
Descriptive Statistics on Months Served in the Army by Battalion Element

Battalion Element	***N***	***M***	***Mdn***	***SD***	**Min & Max Values**	**Lower & Upper Quartiles (25th-75th)**
Battalion Staff	66	95.52	62	72.71	5-270	36-168
Field Artillery	128	48.87	29	45.06	6-228	14-69
Engineers	60	50.03	35	38.87	5-195	20-82
Medics	34	52.32	34	57.08	6-216	10.5-79
Infantry	353	46.88	32	46.93	4-250	14-62

Table A-6
Percentage of Soldiers Using a Computer in Different Phases of Their Formal Education by Rank

	% Use Computer					
Rank	Grade School	Junior High	High School	Technical School	College	Not Use
E1-E2	44%	65%	91%	7%	14%	5%
E3	43%	61%	86%	6%	22%	3%
E4	26%	44%	75%	6%	20%	7%
E5	17%	33%	59%	4%	29%	18%
E6-E9	9%	11%	30%	3%	36%	39%
O1-O5	28%	42%	64%	2%	90%	0%

Table A-7
Percentage of Soldiers Using a Computer in Different Phases of Their Formal Education by Battalion Element

	% Use Computer					
Battalion Element	Grade School	Junior High	High School	Technical School	College	Not Use
Battalion Staff	23%	26%	58%	6%	39%	17%
Field Artillery	26%	49%	73%	5%	38%	8%
Engineers	23%	44%	77%	5%	28%	8%
Medics	44%	47%	61%	0%	42%	11%
Infantry	30%	46%	71%	6%	21%	13%

Table A-8
Number of Educational Settings Where Soldiers Used a Computer by Rank

Rank	# Educational Settings Used a Computer (% soldiers)					
	0	1	2	3	4-5	*M* Settings
E1-E2	5%	29%	16%	41%	8%	2.21
E3	2%	37%	16%	32%	12%	2.17
E4	7%	53%	12%	17%	10%	1.72
E5	18%	44%	20%	14%	4%	1.42
E6-E9	39%	44%	8%	7%	2%	0.90
O1-O5	0%	38%	20%	20%	22%	2.26

Table A-9
Number of Educational Settings Where Soldiers Used a Computer by Battalion Element

Battalion Element	# Educational Settings Used a Computer (% soldiers)					
	0	1	2	3	4-5	*M* Settings
Battalion Staff	17%	48%	14%	9%	12%	1.52
Field Artillery	7%	38%	21%	25%	9%	2.00
Engineers	8%	44%	18%	21%	8%	1.77
Medics	11%	44%	6%	17%	22%	1.94
Infantry	13%	41%	13%	26%	7%	1.75

Table A-10
Percentage of Soldiers by Rank Indicating Computer Ownership and Current Use of a Computer

Rank	% Own a Computer	% Use Computer Now	Where Currently Use Computer		
			Home	Work/ Unit	Trng Facility
E1-E2	31%	73%	58%	8%	29%
E3	43%	78%	63%	10%	30%
E4	48%	81%	66%	23%	30%
E5	72%	86%	76%	48%	13%
E6-E9	87%	95%	83%	72%	15%
O1-O5	96%	100%	96%	92%	22%

Table A-11
Percentage of Soldiers by Battalion Element Indicating Computer Ownership and Current Use of a Computer

Battalion Element	**% Own a Computer**	**% Use Computer Now**	**Where Currently Use Computer**		
			Home	Work/ Unit	Trng Facility
Battalion Staff	78%	97%	85%	77%	15%
Field Artillery	66%	90%	78%	46%	29%
Engineers	54%	85%	75%	36%	25%
Medics	58%	89%	69%	53%	39%
Infantry	50%	77%	63%	19%	23%

Table A-12
Percentage of Soldiers by Rank Indicating Different Levels of Typing Skill

Rank	**Self Ratings of Typing Skill**			
	Hunt & Peck Slowly	Hunt & Peck Quickly	Type Slowly	Type Quickly
E1-E2	13%	35%	24%	28%
E3	11%	42%	31%	15%
E4	17%	39%	22%	23%
E5	15%	48%	17%	20%
E6-E9	16%	55%	11%	17%
O1-O5	2%	24%	32%	42%

Note. Means were 2.66 for E1-E2, 2.50 for E3, 2.51 for E4, 2.41 for E5, 2.30 for E6-E9, and 3.14 for O1-O5.

Table A-13
Percentage of Soldiers by Battalion Element Indicating Different Levels of Typing Skill

Battalion Element	**Self Ratings of Typing Skill**			
	Hunt & Peck Slowly	Hunt & Peck Quickly	Type Slowly	Type Quickly
Battalion Staff	11%	45%	21%	23%
Field Artillery	11%	44%	18%	27%
Engineers	13%	34%	34%	18%
Medics	6%	44%	19%	31%
Infantry	*16%*	*40%*	*22%*	*21%*

Note. Means were 2.56 for battalion staff, 2.60 for Field Artillery, 2.57 for Engineers, 2.75 for Medics, and 2.49 for Infantry.

Table A-14

Frequency With Which Computer Features are Used: Percentage Soldiers by Rank

Group	Frequency (% Soldiers)				
	Daily	Weekly	Monthly	< Monthly	Never
			Mouse		
E1-E2	31%	24%	8%	21%	15%
E3	40%	20%	12%	15%	11%
E4	45%	17%	13%	13%	12%
E5	66%	16%	3%	7%	7%
E6-E9	73%	19%	1%	5%	3%
O1-O5	94%	6%	0%	0%	0%
			Games		
E1-E2	18%	25%	15%	24%	18%
E3	24%	22%	10%	26%	18%
E4	27%	15%	10%	30%	17%
E5	27%	25%	14%	18%	16%
E6-E9	29%	26%	7%	21%	17%
O1-O5	14%	30%	14%	18%	24%
			Icons		
E1-E2	28%	21%	8%	23%	20%
E3	30%	22%	13%	20%	14%
E4	31%	17%	14%	18%	20%
E5	45%	22%	8%	10%	15%
E6-E9	57%	21%	7%	9%	6%
O1-O5	84%	12%	2%	2%	0%
			Menus		
E1-E2	29%	22%	8%	22%	19%
E3	34%	20%	11%	21%	14%
E4	34%	18%	12%	17%	19%
E5	48%	20%	6%	13%	13%
E6-E9	60%	21%	6%	7%	6%
O1-O5	90%	10%	0%	0%	0%

Table A-14 (cont.)
Frequency With Which Computer Features are Used: Percentage Soldiers by Rank

Group	Frequency (% Soldiers)				
	Daily	**Weekly**	**Monthly**	**< Monthly**	**Never**
	Graphics				
E1-E2	12%	23%	14%	22%	29%
E3	11%	21%	15%	30%	23%
E4	14%	10%	12%	34%	29%
E5	21%	18%	11%	30%	19%
E6-E9	27%	16%	16%	29%	12%
O1-O5	20%	20%	30%	28%	2%
	E-Mail				
E1-E2	31%	21%	8%	20%	19%
E3	34%	15%	16%	15%	19%
E4	43%	17%	12%	14%	15%
E5	54%	18%	5%	8%	14%
E6-E9	65%	17%	7%	6%	5%
O1-O5	82%	14%	4%	0%	0%
	Internet				
E1-E2	32%	25%	9%	19%	15%
E3	36%	16%	13%	22%	12%
E4	44%	17%	13%	17%	9%
E5	54%	22%	5%	11%	8%
E6-E9	62%	22%	9%	5%	2%
O1-O5	72%	24%	4%	0%	0%

Table A-15

Frequency With Which Computer Features are Used: Percentage Soldiers by Battalion Element

Group	Frequency (% Soldiers)				
	Daily	Weekly	Monthly	< Monthly	Never
	Mouse				
Battalion Staff	83%	11%	1%	1%	3%
Field Artillery	57%	21%	9%	10%	3%
Engineers	62%	13%	2%	12%	12%
Medics	69%	17%	6%	3%	6%
Infantry	42%	19%	10%	16%	13%
	Games				
Battalion Staff	33%	20%	11%	17%	20%
Field Artillery	18%	27%	15%	23%	17%
Engineers	37%	15%	10%	27%	12%
Medics	39%	28%	3%	19%	11%
Infantry	20%	22%	12%	26%	20%
	Icons				
Battalion Staff	67%	17%	3%	4%	9%
Field Artillery	46%	21%	9%	14%	9%
Engineers	45%	17%	13%	12%	13%
Medics	50%	19%	3%	17%	11%
Infantry	31%	20%	11%	19%	19%
	Menus				
Battalion Staff	67%	15%	3%	6%	9%
Field Artillery	50%	21%	9%	14%	5%
Engineers	47%	17%	13%	13%	10%
Medics	64%	8%	3%	8%	17%
Infantry	33%	21%	8%	18%	18%

Table A-15 (cont.)
Frequency With Which Computer Features are Used: Percentage Soldiers by Battalion Element

Group	Frequency (% Soldiers)				
	Daily	**Weekly**	**Monthly**	**< Monthly**	**Never**
	Graphics				
Battalion Staff	29%	26%	15%	20%	11%
Field Artillery	16%	16%	22%	31%	15%
Engineers	18%	15%	12%	40%	15%
Medics	28%	25%	0%	25%	22%
Infantry	13%	16%	14%	29%	28%
	E-Mail				
Battalion Staff	76%	12%	3%	4%	4%
Field Artillery	50%	20%	11%	10%	9%
Engineers	58%	13%	3%	13%	12%
Medics	64%	22%	3%	0%	11%
Infantry	36%	18%	12%	16%	18%
	Internet				
Battalion Staff	68%	18%	8%	3%	3%
Field Artillery	52%	22%	9%	13%	4%
Engineers	63%	15%	5%	10%	7%
Medics	61%	19%	8%	8%	3%
Infantry	36%	22%	11%	18%	13%

Table A-16

Means (standard deviations) by Rank on the Computer Features Frequency of Use Scales

Feature	Soldier Rank						
	E1-E2 (*n*=129)	E3 (*n*=104)	E4 (*n*=162)	E5 (*n*=109)	E6-E9 (*n*=86)	O1-O5 (*n*=50)	All Groups (*n*=640)
Mouse	2.34 (1.48)	2.63 (1.44)	2.69 (1.46)	3.27 (1.25)	3.56 (0.91)	3.94 (0.24)	2.92 (1.40)
Internet	2.39 (1.48)	2.40 (1.47)	2.72 (1.40)	3.03 (1.34)	3.36 (0.99)	3.68 (0.55)	2.81 (1.38)
Menus	2.21 (1.53)	2.38 (1.49)	2.31 (1.55)	2.77 (1.48)	3.23 (1.19)	3.90 (0.30)	2.62 (1.50)
Icons	2.14 (1.53)	2.33 (1.45)	2.19 (1.54)	2.72 (1.48)	3.14 (1.24)	3.78 (0.58)	2.54 (1.50)
E-mail	2.24 (1.54)	2.29 (1.54)	2.58 (1.51)	2.91 (1.47)	3.33 (1.13)	3.78 (0.50)	2.71 (1.49)
Games	2.01 (1.39)	2.08 (1.48)	2.05 (1.50)	2.27 (1.45)	2.28 (1.50)	1.92 (1.43)	2.10 (1.46)
Graphics	1.66 (1.41)	1.66 (1.33)	1.47 (1.38)	1.92 (1.45)	2.17 (1.40)	2.28 (1.14)	1.77 (1.40)
All Features	2.14 (1.33)	2.25 (1.27)	2.28 (1.26)	2.70 (1.20)	2.99 (1.00)	3.32 (0.45)	2.49 (1.25)

Note. Scale was 0 = never use, 1 = less than monthly, 2 = monthly, 3 = weekly, 4 = daily.

Table A-17
Means (standard deviations) by Battalion Element on the Computer Features Frequency of Use Scales

Feature	Battalion Element					
	Battalion Staff (*n*=66)	Field Artillery (*n*=127)	Engineers (*n*=60)	Medics (*n*=36)	Infantry (*n*=352)	All Bn Elements (*n*=641)
Mouse	3.70 (0.84)	3.18 (1.15)	3.02 (1.48)	3.42 (1.10)	2.61 (1.48)	2.92 (1.39)
Internet	3.45 (0.98)	3.06 (1.22)	3.18 (1.29)	3.28 (1.11)	2.49 (1.46)	2.81 (1.38)
Menus	3.24 (1.31)	2.97 (1.29)	2.77 (1.42)	2.94 (1.60)	2.33 (1.54)	2.62 (1.50)
Icons	3.27 (1.28)	2.83 (1.37)	2.68 (1.48)	2.81 (1.49)	2.25 (1.53)	2.54 (1.50)
E-mail	3.50 (1.07)	2.93 (1.35)	2.93 (1.49)	3.28 (1.28)	2.39 (1.54)	2.71 (1.49)
Games	2.30 (1.56)	2.06 (1.39)	2.38 (1.49)	2.64 (1.46)	1.98 (1.45)	2.10 (1.46)
Graphics	2.42 (1.37)	1.87 (1.30)	1.82 (1.37)	2.11 (1.60)	1.57 (1.38)	1.77 (1.40)
All Features	3.13 (0.95)	2.69 (1.10)	2.68 (1.18)	2.92 (1.15)	2.23 (1.30)	2.49 (1.25)

Note. Scale was 0 = never use, 1 = less than monthly, 2 = monthly, 3 = weekly, 4 = daily.

Table A-18
Descriptive Statistics on the Sum of Feature Use Ratings by Rank

Rank	Sum of Feature Use Ratings					
	N	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
E1-E2	129	14.98	17	9.36	0-28	7-23
E3	104	15.76	17	8.87	0-28	7-24
E4	162	16.02	17	8.88	0-28	9-24
E5	109	18.88	22	8.44	0-28	13-26
E6-E9	86	20.99	23	6.98	0-28	19-26
O1-O5	50	23.28	24	3.16	15-28	22-25

Note. The 7 features were rated on a 0 to 4-point scale, ranging from "never" used to "daily" use. Maximum score was 28 representing daily use of all 7 features; minimum score was 0 indicating a soldier never used any of the 7 features.

Table A-19

Descriptive Statistics on the Sum of Feature Use Ratings by Battalion Element

Battalion Element	Sum of Feature Use Ratings					
	N	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
Battalion Staff	66	21.89	24	6.66	0-28	20-27
Field Artillery	127	18.83	21	7.72	0-28	14-25
Engineers	60	18.78	22	8.29	0-28	13-25
Medics	36	20.47	23.50	8.04	0-28	15-27
Infantry	352	15.62	17	9.09	0-28	7-24

Note. The 7 features were rated on a 0 to 4-point scale, ranging from "never" used to "daily" use. Maximum score was 28 representing daily use of all 7 features; minimum score was 0 indicating a soldier never used any of the 7 features.

Table A-20

Percentage of Soldiers by Rank Indicating Different Levels of Computer Skill

Rank	Self-Ratings of Computer Skill						
	N	Novice	Good w 1 softw program	Good w several Soft Progr	1 Progm Lang + Software	Several Progm Lang+Soft	Bill Gates hire me
E1-E2	130	46%	13%	32%	6%	1%	1%
E3	104	39%	17%	31%	12%	0%	0%
E4	162	48%	16%	29%	5%	1%	1%
E5	111	40%	11%	38%	8%	2%	2%
E6-E9	87	38%	17%	37%	7%	1%	0%
O1-O5	50	8%	16%	58%	16%	0%	2%

Table A-21

Percentage of Soldiers by Battalion Element Indicating Different Levels of Computer Skill

Battalion Element	Self-Ratings of Computer Skill						
	N	Novice	Good w 1 softw program	Good w several Soft Progr	1 Progm Lang + Software	Several Progm Lang+Soft	Bill Gates hire me
Battalion Staff	66	29%	11%	47%	9%	3%	1%
Field Artillery	127	31%	20%	39%	8%	1%	1%
Engineers	61	43%	15%	34%	7%	2%	0%
Medics	36	28%	14%	44%	14%	0%	0%
Infantry	355	47%	14%	30%	8%	1%	1%

Table A-22
Descriptive Statistics on Self-Ratings of Computer Skill by Rank

Rank	Self-Ratings of Computer Skill					
	N	*M*	*Mdn*	*SD*	Range	Interquartile
E1-E2	130	2.06	2	1.14	1-6	1-3
E3	104	2.16	2	1.09	1-4	1-3
E4	162	1.97	2	1.09	1-6	1-3
E5	111	2.27	2	1.22	1-6	1-3
E6-E9	87	2.16	2	1.05	1-5	1-3
O1-O5	50	2.90	3	0.90	1-6	2-3

Note. Scores: Novice = 1, One software program = 2; Several software program = 3, One program language + software = 4, Program languages + software = 5; Bill Gates hire = 6.

Table A-23
Descriptive Statistics on Self-Ratings of Computer Skill by Battalion Element

Battalion Element	Self-Ratings of Computer Skill					
	N	*M*	*Mdn*	*SD*	Range	Interquartile
Battalion Staff	66	2.52	3	1.18	1-6	1-3
Field Artillery	127	2.30	2	1.06	1-6	1-3
Engineers	61	2.10	2	1.09	1-5	1-3
Medics	36	2.44	3	1.05	1-4	1-3
Infantry	355	2.04	2	1.13	1-6	1-3

Note. Scores: Novice = 1, One software program = 2; Several software program = 3, One program language + software = 4, Program languages + software = 5; Bill Gates hire = 6.

Table A-24
Descriptive Statistics on Icon Test Scores by Rank

Rank	18-Item Icon Test					
	N	*M*	*Mdn*	*Range*	*SD*	Interquartile Range
E1-E2	129	8.34	9	0-16	3.95	5.50-11.50
E3	105	8.90	9.50	0-16	3.57	6.50-11.50
E4	160	8.04	8	0-16	3.93	6-11
E5	109	9.35	10	0-17	3.92	7-12.50
E6-E9	87	10.98	11.50	0-17	3.84	9-14
O1-O5	50	12.48	12.50	0-17	3.07	11.50-14.50

Table A-25
Descriptive Statistics on Icon Test Scores by Battalion Element

Battalion Element	18-Item Icon Test					
	N	*M*	*Mdn*	*Range*	*SD*	Interquartile Range
Battalion Staff	66	11.30	11.50	0-17	3.88	9-14.50
Field Artillery	128	9.61	10	0-16	3.90	7-13
Engineers	61	9.37	10	1-16	3.70	7-12
Medics	35	9.37	9	4-16	2.83	7-11
Infantry	351	8.63	9.50	0-17	4.09	6-12

Table A-26
Icon Difficulty

Easy Icons	% Correct	Icons of Intermediate Difficulty	% Correct	Difficult Icons	% Correct
Recycle	89%	Open file	73%	Fill	22%
Cut	81%	Help	70%	Paste	21%
Spell check	80%	Zoom	62%	New file	12%
Print	75%	Save	59%	Group	5%
		Close	57%	Arrow	2%
		Cursor	56%		
		Center	48%		
		Copy	45%		
		Undo	35%		

Note. Easy Icons: 75% or more soldiers identified correctly. Intermediate difficulty icons: 26% to 74% of soldiers identified correctly. Difficult icons: 25% or fewer soldiers identified correctly.

Table A-27
Percentage of Soldiers Correctly Naming Each Icon by Rank

Rank	Icon Name						
	N	Spell Check	Cursor	Zoom	Open File	Save	Print
E1-E2	128	78%	55%	61%	69%	58%	75%
E3	104	80%	53%	62%	75%	58%	79%
E4	160	75%	54%	58%	67%	46%	66%
E5	109	81%	55%	64%	74%	61%	80%
E6-E9	87	91%	69%	65%	84%	70%	76%
O1-O5	49	98%	61%	75%	92%	94%	100%
		Cut	Copy	Paste	Undo	New File	Arrow
E1-E2	128	77%	43%	14%	17%	4%	0%
E3	104	86%	44%	10%	32%	9%	1%
E4	160	78%	39%	14%	26%	8%	0%
E5	109	84%	45%	20%	38%	13%	4%
E6-E9	87	85%	53%	39%	61%	19%	5%
O1-O5	49	94%	65%	57%	73%	41%	10%
		Recycle	Help	Center	Fill	Close	Group
E1-E2	128	89%	67%	41%	19%	50%	2%
E3	104	90%	68%	53%	20%	60%	1%
E4	160	89%	64%	32%	16%	56%	2%
E5	109	91%	72%	50%	24%	57%	5%
E6-E9	87	93%	82%	64%	28%	74%	13%
O1-O5	49	92%	90%	88%	43%	55%	12%

Table A-28
Percentage of Soldiers Correctly Naming Each Icon by Battalion Element

Battalion Element	*N*	Spell Check	Cursor	Zoom	Open File	Save	Print
		Icon Name					
Battalion Staff	66	88%	65%	70%	88%	70%	85%
Field Artillery	127	84%	56%	71%	79%	65%	75%
Engineers	61	87%	59%	57%	80%	57%	67%
Medics	35	83%	54%	69%	74%	57%	83%
Infantry	349	78%	56%	59%	69%	56%	76%
		Cut	Copy	Paste	Undo	New File	Arrow
Battalion Staff	66	91%	53%	36%	62%	27%	9%
Field Artillery	127	83%	48%	30%	40%	13%	0%
Engineers	61	85%	47%	18%	41%	21%	0%
Medics	35	91%	37%	17%	40%	6%	3%
Infantry	349	79%	44%	16%	27%	8%	2%
		Recycle	Help	Center	Fill	Close	Group
Battalion Staff	66	92%	85%	65%	39%	59%	17%
Field Artillery	127	93%	72%	56%	19%	58%	7%
Engineers	61	95%	67%	47%	25%	57%	3%
Medics	35	97%	86%	40%	11%	63%	0%
Infantry	349	87%	68%	45%	21%	57%	2%

Table A-29
Percentage of Soldiers Using Computer Features as a Function of Computer Ownership

Own a Computer	Frequency of Use				
	Never	< Monthly	Monthly	Weekly	Daily
			Mouse		
Yes	1%	3%	2%	13%	81%
No	22%	24%	15%	25%	14%
			Icons		
Yes	4%	8%	7%	18%	63%
No	29%	26%	13%	21%	10%
			Menus		
Yes	3%	7%	5%	17%	67%
No	29%	26%	12%	21%	11%
			Internet		
Yes	2%	5%	6%	17%	70%
No	19%	27%	15%	25%	15%
			E-Mail		
Yes	4%	4%	7%	15%	71%
No	27%	24%	13%	20%	15%
			Games		
Yes	10%	17%	10%	26%	37%
No	28%	34%	13%	18%	7%
			Graphics		
Yes	9%	27%	18%	19%	27%
No	39%	32%	11%	16%	2%

Note. Within rounding error, rows sum to 100%. For all battalion elements combined, the *N* for computer ownership = 366. *N* for no ownership = 274.

Table A-30
Correlations Among Background Variables by Rank

Background Variable	Rank	Self-Rating	Own a Computer	Use a Computer	# Educational Settings
Use of Computer Features (Sum)	All	.49**	.63**	.67**	.16**
	E1-E2	.40**	.60**	.68**	.26**
	E3	.44**	.64**	.70**	.29**
	E4	.52**	.55**	.66**	.25**
	E5	.57**	.62**	.59**	.18
	E6-E9	.56**	.49**	.58**	.36**
	O1-O5	.25	.28*	---	-.24
Self-Rating	All		.32**	.30**	.29**
	E1-E2		.30**	.29**	.37**
	E3		.33**	.27**	.17
	E4		.24**	.29**	.35**
	E5		.32**	.37**	.29**
	E6-E9		.39**	.24*	.41**
	O1-O5		.09	---	.08
Own a Computer	All			.45**	.01
	E1-E2			.40**	.19*
	E3			.41**	.11
	E4			.36**	.11
	E5			.48**	.15
	E6-E9			.41**	.21
	O1-O5			---	-.13
Use a Computer	All				.14**
	E1-E2				.25**
	E3				.26**
	E4				.22**
	E5				.18
	E6-E9				.14
	O1-O5				---

Note. Sample sizes for each correlation varied with the number of missing data points for each variable. For the total sample the $N = 646$; E1&E2 $N = 129$; E3 $N = 104$; E4 $N = 162$; E5 $N = 109$; E6-E9 $N = 86$; O1-O5 $N = 50$.

Correlations for using a computer for group O1-O5 could not be calculated because all used a computer.

$^{*}p < .05$, $^{**}p < .01$

Table A-31
Correlations Among Background Variables by Battalion Element

Background Variable	Bn Element	Self-Rating	Own a Computer	Use a Computer	# Educational Settings
Use of Computer Features (Sum)	All	.49**	.63**	.67**	.16**
	Bn Staff	.49**	.56**	.48**	.29*
	Fld Arty	.49**	.57**	.58**	.24**
	Eng	.44**	.59**	.65**	.07
	Medics	.56**	.51**	.69**	.23
	Infantry	.48**	.64**	.68**	.13*
Self-Rating	All		.32**	.30**	.29**
	Bn Staff		.17	.22	.32**
	Fld Arty		.26**	.27**	.27**
	Eng		.41**	.42**	.40**
	Medics		.31	.24	.19
	Infantry		.31**	.29**	.29**
Own a Computer	All			.45**	.01
	Bn Staff			.34**	.16
	Fld Arty			.36**	.02
	Eng			.36**	.10
	Medics			.42*	.13
	Infantry			.47**	-0.5
Use a Computer	All				.14**
	Bn Staff				.15
	Fld Arty				.11
	Eng				.20
	Medics				.24
	Infantry				.15**

Note. Sample sizes for each correlation varied with the number of missing data points for each variable. For the total sample the $N = 646$; Bn & Bde Staff $N = 66$; Field Artillery $N = 128$; Eng $N = 61$; Medics $N = 36$; Infantry $N = 355$.
$^{*}p < .05$, $^{**}p < .01$

Table A-32

Percentage of All Soldiers Indicating Experience With Computer Software Programs and Programming Languages, Displayed by Rank

	Percentage of Soldiers						
	E1-E2 (*n*=130)	E3 (*n*=105)	E4 (*n*=162)	E5 (*n*=111)	E6-E9 (*n*=87)	O1-O5 (*n*=50)	All Groups (*n*=646)
Software Programs							
Office Type	11%	8%	12%	17%	21%	42%	15%
Word Processing	17%	26%	17%	24%	22%	48%	23%
Spreadsheets	10%	15%	11%	15%	19%	30%	15%
Graphics	9%	11%	7%	14%	17%	32%	13%
Operating Systems	15%	11%	12%	16%	11%	12%	13%
Other Software	9%	7%	6%	13%	22%	34%	12%
Programming Languages	5%	6%	3%	6%	7%	18%	6%

Table A-33

Percentage of All Soldiers Indicating Experience With Computer Software Programs and Programming Languages, Displayed by Battalion Element

	Percentage of Soldiers					
	Battalion Staff (*n* = 66)	Field Artillery (*n* = 128)	Engineers (*n* = 61)	Medics (*n* = 36)	Infantry (*n* = 355)	All Elements (*n* = 646)
Software Programs						
Office Type	21%	18%	10%	19%	14%	15%
Word Processing	29%	23%	29%	22%	20%	23%
Spreadsheets	26%	16%	16%	19%	12%	15%
Graphics	18%	12%	18%	17%	11%	13%
Operating Systems	14%	19%	8%	14%	11%	13%
Other Software	24%	16%	10%	14%	9%	12%
Programming Languages	14%	5%	2%	8%	5%	6%

Note. Not all the soldiers who indicated they were skilled with software packages answered this question. A soldier was counted only once if he indicated skill with more than one software program within a specific category, e.g., knew both Word and Word Perfect word processing programs, or knew several programming languages, Basic, C++ and Pascal. Excluded from these tallies were generic responses such as "spreadsheets," "word processing," and "all graphics" programs. To be included in the count, a specific software program had to be listed by the soldier.

Table A-34

Percentage of All Soldiers Indicating Experience With Specific Software Programs and Languages, Displayed by Battalion Element

	Percentage of Soldiers					
	Battalion Staff (n = 66)	Field Artillery (n = 128)	Engineers (n = 61)	Medics (n = 36)	Infantry (n = 355)	All Elements (n = 646)
Office Type						
Microsoft Office	21%	12%	7%	11%	10%	11%
Microsoft Works	0%	7%	0%	6%	5%	4%
Lotus Smart Suite	0%	2%	5%	3%	1%	1%
Other	0%	1%	0%	0%	0%	0%
Word Processing						
Microsoft Word	27%	20%	29%	22%	18%	21%
Word Perfect	4%	3%	2%	3%	2%	3%
Other	0%	1%	0%	0%	1%	0%
Spreadsheets						
Microsoft Excel	26%	15%	16%	19%	12%	15%
Other	1%	1%	3%	0%	0%	1%
Graphics						
Power Point	15%	9%	11%	17%	7%	9%
Adobe	0%	2%	2%	0%	2%	1%
Corel Draw	0%	0%	2%	0%	1%	1%
Other	3%	2%	10%	3%	3%	4%
Operating Systems						
Windows	9%	17%	5%	8%	11%	11%
DOS	1%	5%	5%	6%	1%	3%
Other OS	3%	2%	3%	3%	0%	1%
Other Software						
Form Flow	5%	6%	2%	8%	2%	4%
Calendar	1%	5%	2%	0%	1%	2%
Financial	4%	3%	3%	3%	2%	3%
Internet/E-mail	8%	3%	0%	6%	3%	3%
Other	7%	4%	5%	6%	2%	4%
Programming Languages						
BASIC	9%	3%	0%	6%	3%	4%
C++	6%	1%	0%	6%	2%	2%
HTML	1%	1%	0%	0%	1%	1%
Other	9%	6%	2%	3%	4%	5%

Note. Not all the soldiers who indicated skill with software packages answered this question. Each citation of a specific software package or programming language was tallied in computing the percentages. If a soldier cited Power Point and Adobe, each was tallied.

Table A-35

Percentage of Non-novice Soldiers Indicating Experience With Computer Software Programs, Displayed by Battalion Element

	Percentage of Soldiers					
	Battalion Staff	Field Artillery	Engineer	Medics	Infantry	All Elements
# Non-novice Soldiers	47 of 66	88 of 128	35 of 61	26 of 36	188 of 355	384 of 646
Response Rate by Non novices	74% (35/47)	64% (56/88)	69% (24/35)	54% (14/54)	63% (119/188)	65% (248/384)
% Non-novice Soldiers Listing Programs – by Software Category						
Office Type	40% (14/35)	41% (23/56)	21% (5/24)	50% (7/14)	40% (47/119)	39% (96/248)
Word Processing	54% (19/35)	54% (30/56)	75% (18/24)	57% (8/14)	57% (68/119)	58% (143/248)
Spreadsheets	49% (17/35)	34% (19/56)	42% (10/24)	50% (7/14)	32% (38/119)	37% (91/248)
Graphics	34% (12/35)	29% (16/56)	46% (11/24)	43% (6/14)	32% (38/119)	33% (83/248)
Operating Systems	23% (8/35)	39% (22/56)	12% (3/24)	36% (5/14)	33% (39/119)	31% (77/248)
Other Software	46% (16/35)	37% (21/56)	25% (6/24)	36% (5/14)	26% (31/119)	31% (79/248)

Note. A soldier was counted only once if he indicated skill with more than one software program within a specific category, e.g., knew both Word and Word Perfect word processing programs. To be included in the count, a specific software program, by name, had to be listed by the soldier. Soldiers who indicated novice computer skill but answered the software question were eliminated from this analysis (n = 14).

Table A-36

Percentage of Non-novice Soldiers Listing Specific Software Programs, Displayed by Software Category and by Battalion Element

	Percentage of Soldiers					
	Battalion Staff ($n = 35$)	Field Artillery ($n = 56$)	Engineers ($n = 24$)	Medics ($n = 14$)	Infantry ($n = 119$)	All Elements ($n = 248$)
Office Type						
Microsoft Office	100% (14/14)	69% (16/23)	80% (4/5)	57% (4/7)	70% (33/47)	74% (71/96)
Microsoft Works	0% (0/14)	39% (9/23)	0% (0/5)	28% (2/7)	32% (15/47)	27% (26/96)
Lotus Smart Suite	0% (0/14)	9% (2/23)	40% (2/5)	14% (1/7)	6% (3/47)	8% (8/96)
Other	0% (0/14)	4% (1/23)	0% (0/5)	0% (0/7)	2% (1/47)	2% (2/96)
Word Processing						
Microsoft Word	95% (18/19)	87% (26/30)	100% (18/18)	100% (8/8)	91% (62/68)	92% (132/143)
Word Perfect	16% (3/19)	13% (4/30)	5% (1/18)	12% (1/8)	10% (7/68)	11% (16/143)
Other	0% (0/19)	3% (1/30)	0% (0/18)	0% (0/8)	1% (1/68)	1% (2/143)
Spreadsheets						
Microsoft Excel	100% (17/17)	95% (18/19)	100% (10/10)	100% (7/7)	100% (38/38)	99% (90/91)
Other	6% (1/17)	5% (1/19)	20% (2/10)	0% (0/7)	0% (0/38)	4% (4/91)
Graphics						
Power Point	83% (10/12)	75% (12/16)	64% (7/11)	100% (6/6)	66% (25/38)	72% (60/83)
Adobe	0% (0/12)	12% (2/16)	36% (4/11)	0% (0/6)	16% (6/38)	11% (9/83)
Corel Draw	0% (0/12)	0% (0/16)	9% (1/11)	0% (0/6)	10% (4/38)	6% (5/83)
Other	16% (2/12)	12% (2/16)	54% (6/11)	17% (1/6)	26% (10/38)	25% (21/83)
Operating Systems						
Windows	62% (5/8)	86% (19/22)	66% (2/3)	60% (3/5)	95% (37/39)	86% (66/77)
DOS	12% (1/8)	27% (6/22)	66% (2/3)	60% (3/5)	13% (5/39)	22% (17/77)

Table A-36 (cont)

Other Software						
Form Flow	18% (3/16)	38% (8/21)	17% (1/6)	60% (3/5)	29% (9/31)	30% (24/79)
Calendar	6% (1/16)	28% (6/21)	17% (1/6)	0% (0/5)	13% (5/31)	16% (13/79)
Financial	18% (3/16)	19% (4/21)	33% (2/6)	20% (1/5)	26% (8/31)	23% (18/79)
Internet/E-mail	37% (6/16)	19% (4/21)	0% (0/6)	40% (2/5)	29% (9/31)	30% (24/79)

Note. Not all the soldiers who indicated skill with software packages answered this question. Each citation of a specific software package was tallied in computing the percentages. For example, if a soldier cited Power Point and Adobe, each was tallied.

Table A-37

Percentage of Non-novice Soldiers Listing Programming Languages, Displayed by Battalion Element

Response Rates	**Percentage of Soldiers**					
	Battalion Staff	Field Artillery	Engineer	Medics	Infantry	All Elements
All Soldiers	14% (9/66)	5% (7/128)	2% (1/61)	8% (3/36)	5% (19/342)	6% (39/646)
Non-novices	19% (9/47)	8% (7/88)	3% (1/35)	11% (3/26)	10% (19/188)	10% (39/384)
Breakdown for Non-novices						
Soldiers With No Programming Experience	5% (2/38)	1% (1/76)	0% (0/30)	0% (0/21)	3% (4/155)	2% (7/320)
Soldiers With Programming Experience [a]	78% (7/9)	50% (6/12)	20% (1/5)	60% (3/5)	45% (15/33)	50% (32/64)

Note. A soldier was counted only once if he indicated skill with more than one programming language, e.g., knew Basic, C++ and Pascal. Excluded from these tallies were generic responses. To be included in the count, a specific programming language had to be listed by the soldier.

[a] This is the only group of soldiers who should have answered the programming language question. However, there were 7 of the 320 (see previous row) who said they had no programming experience and listed a programming language. No soldier who indicated novice computer skill answered the programming question.

Table A-38

Percentage of Soldiers With Programming Experience Listing Specific Programming Languages

Programming Languages	Battalion Staff ($n = 9$)	Field Artillery ($n = 12$)	Engineer ($n = 5$)	Medics ($n = 5$)	Infantry ($n = 33$)	All Elements ($n = 64$)
BASIC	55%	25%	0%	40%	27%	30%
C++	44%	8%	0%	40%	15%	19%
HTML	11%	17%	0%	0%	6%	8%
Pascal	22%	8%	20%	0%	18%	14%
Other	33%	25%	0%	20%	15%	19%

Note. Overall response rate to this question was 50% (see Table A-37). Each citation of a specific programming language was tallied in computing the percentages. If a soldier cited BASIC and C++, each was tallied. Consequently, column sums for soldiers within a specific battalion element can be greater than 100%.

Appendix B

Data Tables for Specialists

Table B-1
Descriptive Statistics on Age for Specialists

Battalion Element	*N*	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
Battalion Staff	13	26.08	25	4.68	21-34	22-30
Field Artillery	24	23.38	22	2.97	19-31	22-25
Engineers	23	23.00	22	2.46	20-29	21-24
Medics	13	23.08	22	2.63	21-29	21-24.5
Infantry	88	23.31	23	2.82	19-32	21-25

Table B-2
Number of Educational Settings Where Specialists Used a Computer

Battalion Element	# Educational Settings Used a Computer (% Specialists)					
	0	1	2	3	4-5	*M* Settings
Battalion Staff	8%	61%	0%	15%	15%	1.69
Field Artillery	0%	71%	17%	8%	4%	1.46
Engineers	0%	52%	22%	22%	4%	1.78
Medics	14%	29%	7%	21%	29%	2.21
Infantry	10%	51%	10%	18%	10%	1.69

Table B-3
Percentage of Specialists Indicating Computer Ownership and Current Use of a Computer

Battalion Element	% Own a Computer	% Use Computer Now	Where Currently Use Computer		
			Home	Work/ Unit	Trng Facility
Battalion Staff	50%	100%	54%	61%	38%
Field Artillery	62%	92%	83%	25%	29%
Engineers	35%	74%	65%	26%	34%
Medics	57%	93%	79%	57%	43%
Infantry	45%	76%	61%	10%	25%

Table B-4
Percentage of Specialists Indicating Different Levels of Typing Skill

Battalion Element	Self Ratings of Typing Skill			
	Hunt & Peck Slowly	Hunt & Peck Quickly	Type Slowly	Type Quickly
Battalion Staff	15%	46%	23%	15%
Field Artillery	21%	37%	21%	21%
Engineers	17%	35%	26%	22%
Medics	0%	43%	14%	43%
Infantry	18%	39%	22%	22%

Note. Means were 2.38 for battalion staff, 2.42 for Field Artillery, 2.52 for Engineers, 3.00 for Medics and 2.47 for Infantry.

Table B-5
Descriptive Statistics on the Sum of Feature Use Ratings for Specialists

Battalion Element	Sum of Feature Use Ratings					
	N	*M*	*Mdn*	*SD*	Min & Max Values	Lower & Upper Quartiles (25th-75th)
Battalion Staff	13	18.23	21	8.92	0-28	11-26.5
Field Artillery	24	15.54	16.5	8.29	4-28	7-22
Engineers	23	16.22	15	8.80	0-28	8-25
Medics	14	20.79	23	7.28	5-28	14.5-27.2
Infantry	88	15.01	14	9.15	0-28	7-23

Note. The 7 features were rated on a 0 to 4-point scale, ranging from "never" used to "daily" use. Maximum score was 28 representing daily use of all 7 features; minimum score was 0 indicating a soldier never used any of the 7 features.

Table B-6
Frequency With Which Computer Features are Used: Percentage of Specialists by Battalion Element

Group	Frequency (% Specialists)				
	Daily	**Weekly**	**Monthly**	**< Monthly**	**Never**
			Mouse		
Battalion Staff	69%	15%	0%	8%	8%
Field Artillery	42%	25%	8%	21%	4%
Engineers	52%	9%	4%	17%	17%
Medics	64%	29%	0%	0%	7%
Infantry	37%	15%	20%	12%	15%
			Games		
Battalion Staff	23%	15%	7%	31%	23%
Field Artillery	25%	12%	4%	46%	12%
Engineers	30%	13%	9%	35%	13%
Medics	43%	29%	0%	7%	21%
Infantry	25%	15%	14%	28%	18%
			Icons		
Battalion Staff	46%	23%	0%	0%	31%
Field Artillery	29%	8%	17%	25%	21%
Engineers	35%	17%	17%	9%	22%
Medics	50%	14%	0%	21%	14%
Infantry	25%	18%	16%	22%	19%
			Menus		
Battalion Staff	38%	31%	0%	0%	31%
Field Artillery	29%	21%	12%	29%	8%
Engineers	30%	17%	22%	13%	17%
Medics	64%	7%	0%	7%	21%
Infantry	31%	18%	12%	18%	20%

Table B-6 (cont.)
Frequency With Which Computer Features are Used: Percentage of Specialists by Battalion Element

Group	Frequency (% Specialists)				
	Daily	**Weekly**	**Monthly**	**< Monthly**	**Never**
	Graphics				
Battalion Staff	23%	15%	15%	15%	31%
Field Artillery	12%	0%	21%	46%	21%
Engineers	4%	4%	13%	52%	26%
Medics	29%	29%	0%	14%	29%
Infantry	14%	11%	11%	32%	32%
	E-Mail				
Battalion Staff	46%	31%	8%	8%	8%
Field Artillery	42%	12%	17%	12%	17%
Engineers	56%	4%	4%	26%	9%
Medics	64%	36%	0%	0%	0%
Infantry	35%	16%	15%	15%	19%
	Internet				
Battalion Staff	61%	15%	15%	0%	8%
Field Artillery	42%	17%	8%	29%	4%
Engineers	61%	4%	13%	17%	4%
Medics	57%	36%	0%	7%	0%
Infantry	36%	18%	16%	17%	12%

Table B-7
Percentage of Specialists Indicating Different Levels of Computer Skill

Battalion Element	Self-Ratings of Computer Skill						
	N	Novice	Good w 1 softw program	Good w several Soft Progr	1 Progm Lang + Software	Several Progm Lang+Soft	Bill Gates hire me
Battalion Staff	13	38%	15%	31%	8%	8%	0%
Field Artillery	24	42%	29%	21%	8%	0%	0%
Engineers	23	52%	17%	26%	0%	4%	0%
Medics	14	36%	14%	36%	14%	0%	0%
Infantry	88	52%	12%	31%	3%	0%	1%

Table B-8
Descriptive Statistics on Self-Ratings of Computer Skill for Specialists

Battalion Element	**Self-Ratings of Computer Skill**					
	N	*M*	*Mdn*	*SD*	Range	Interquartile
Battalion Staff	13	2.31	2	1.31	1-5	1-3
Field Artillery	24	1.96	2	0.99	1-4	1-3
Engineers	23	1.87	1	1.10	1-5	1-3
Medics	14	2.29	2.5	1.14	1-4	1-3
Infantry	88	1.90	1	1.07	1-6	1-3

Note. Scores: Novice = 1, One software program = 2; Several software program = 3, One program language + software = 4, Program languages + software = 5; Bill Gates hire = 6.

Table B-9
Descriptive Statistics on Icon Test Scores for Specialists

	18-Icon Test				
Battalion Element	*M*	*Mdn*	*Range*	*SD*	Interquartile Range
Battalion Staff	8.00	9	0-13	4.05	5-11
Field Artillery	7.15	7.75	0-13	3.55	4-10
Engineers	8.78	9.50	1-16	3.84	7-11
Medics	8.96	8	6-13	2.03	7-11
Infantry	7.96	8	0-16	4.23	5-11

Table B-10
Percentage of All Specialists Indicating Experience With Computer Software Programs and Programming Languages

	Percentage of Specialists					
	Battalion Staff (n = 13)	Field Artillery (n = 24)	Engineers (n = 23)	Medics (n = 14)	Infantry (n = 88)	All Elements (n = 646)
Software Programs						
Office Type	15%	17%	9%	7%	12%	15%
Word Processing	15%	12%	30%	7%	16%	23%
Spreadsheets	23%	4%	9%	7%	12%	15%
Graphics	0%	8%	13%	0%	8%	13%
Operating Systems	8%	17%	0%	14%	14%	13%
Other Software	15%	4%	9%	0%	3%	12%
Programming Languages	8%	4%	0%	7%	2%	6%

Note. Not all the specialists who indicated they were skilled with software packages answered these questions. A soldier was counted only once if he indicated skill with more than one software program within a specific category, e.g., knew both Word and Word Perfect word processing programs, or knew several programming languages, Basic, C++ and Pascal. Excluded from these tallies were generic responses such as "spreadsheets," "word processing," and "all graphics" programs. To be counted, a specific software program had to be listed.

Table B-11
Percentage of Non-novice Specialists Listing Software Programs

	Percentage of Specialists					
	Battalion Staff	Field Artillery	Engineer	Medics	Infantry	All Elements
# Non-novice Specialists	8 of 13	14 of 24	11 of 23	9 of 14	42 of 88	84 of 162
Response Rate by Non novices	62% (5/8)	50% (7/14)	72% (8/11)	22% (2/9)	64% (27/42)	58% (49/84)
% Non-novice Specialists Listing Software Programs - by Software Category						
Office Type	40% (2/5)	57% (4/7)	25% (2/8)	50% (1/2)	37% (10/27)	23% (19/84)
Word Processing	40% (2/5)	43% (3/7)	87% (7/8)	50% (1/2)	48% (13/27)	31% (26/84)
Spreadsheets	60% (3/5)	14% (1/7)	25% (2/8)	50% (1/2)	37% (10/27)	20% (17/84)
Graphics	0% (0/5)	28% (2/7)	37% (3/8)	0% (0/2)	26% (7/27)	14% (12/84)
Operating Systems	20% (1/5)	43% (3/7)	0% (0/8)	100% (2/2)	41% (11/27)	20% (17/84)
Other Software	40% (2/5)	14% (1/7)	25% (2/8)	0% (0/2)	15% (4/27)	11% (9/84)

Note. A soldier was counted only once if he indicated skill with more than one software program within a specific category, e.g., knew both Word and Word Perfect word processing programs. To be included in the count, a specific software program had to be listed by the soldier. Soldiers who indicated novice computer skill but answered the software question were eliminated from this analysis ($n = 3$).

Table B-12
Percentage of Specialists Listing Programming Languages

Response Rates	**Percentage of Specialists**					
	Battalion Staff	Field Artillery	Engineer	Medics	Infantry	All Elements
All Skill Levels	8% (1/13)	4% (1/24)	0% (0/23)	7% (1/14)	2% (2/88)	3% (5/162)
Non Novices	12% (1/8)	7% (1/14)	0% (0/11)	11% (1/9)	5% (2/42)	6% (5/84)
Breakdown for Non-novices						
Specialists With no Programming Experience	0% (0/6)	0% (0/12)	0% (0/10)	0% (0/7)	5% (2/38)	3% (2/73)
Specialists With Programming Experience [a]	50% (1/2)	50% (1/2)	0% (0/1)	50% (1/2)	0% (0/4)	27% (3/11)

Note. A soldier was counted only once if he indicated skill with more than one programming language, e.g., knew Basic, C++ and Pascal. Excluded from these tallies were generic responses. To be counted, a specific programming language had to be listed by the soldier.
[a] This is the only group of soldiers who should have answered the question. However, there were 2 of the 73 specialists (see prior row in table) who said they had no programming experience, yet listed a programming language. No soldiers who indicated novice computer skill answered the programming question.

Appendix C

Survey Forms

US ARMY RESEARCH INSTITUTE, FT. BENNING, G/

COMPUTER SURVEY

The U.S. Army Research Institute (ARI) Field Unit at Fort Benning, Georgia is conducting research to determine the computer use and skills of Army personnel. The long-range goal is to determine possible training needs as requirements for computer use increase for all duty positions.

The attached questionnaire contains items designed to determine how much and at what level of expertise you use computers. Also, there is a test of your ability to identify the functions of various icons.

Please respond to all items in the spaces provided. For statistical purposes, we ask that you provide your name and other background information.

We appreciate your cooperation and your time. Your responses will remain anonymous in the processing of all data.

Name:_____

Age: _____

Rank/Grade (*Circle one*).

E1 E2 E3 E4 E5 E6 E7 E8 E9

O1 O2 O3 O4 O5 O6

WO1 CW2 CW3 CW4 CW5

Years and months active duty in Army: _____years _____months

What is your current duty position? _____

What is your unit? _____

What is your Branch? (*Circle one*):

Infantry Armor Field Artillery Combat Engineer Medical Service Other _____

If officer, what is your source of commission? (*Circle one*): West Point ROTC OCS

If enlisted, what is your MOS? _____

1. When did you use computers in your education? *(Circle all that apply)*
   Grade School Jr High High School Technical School College Did Not Use

2. Where do you currently use a computer? *(Circle all that apply)*

   Home/barracks/BOQ Unit/Work Site Library/Learning Ctr/Training Facility Do Not Use

3. For *each* of the following questions, *circle the response* that best describes you.

   a. Do you own a personal computer? Yes No

   b. How often do you: (circle how frequently you use each)

•Use a mouse?	Daily, Weekly, Monthly, Less Often, Never
•Play computer games?	Daily, Weekly, Monthly, Less Often, Never
•Use icon-based programs/software?	Daily, Weekly, Monthly, Less Often, Never
•Use programs/software with pull-down menus?	Daily, Weekly, Monthly, Less Often, Never
•Use graphics/drawing features in software packages?	Daily, Weekly, Monthly, Less Often, Never
•Use E-mail (at home or at work)?	Daily, Weekly, Monthly, Less Often, Never
•Use the Internet?	Daily, Weekly, Monthly, Less Often, Never

4. Which of the following best describes your typing ability? (*check √ one*)
   ____ Hunt and peck slowly
   ____ Hunt and peck quickly
   ____ Type slowly while not looking at the keyboard
   ____ Type quickly while not looking at the keyboard

5. Which of the following best describes your expertise with computers? (*check √ one*)
   ____ Novice
   ____ Good with one type of software package (such as word processing or work calendars or slides)
   ____ Good with several software packages
   ____ Can program in one language and use several software packages
   ____ Can program in several languages and use several software packages
   ____ Expert – Bill Gates would hire me

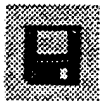
   If you are good with one or more software packages, please list them.

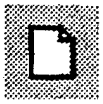
   _____

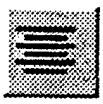
   If you can program in one or more languages, please name these languages

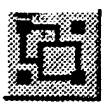
   _____

6. What is the function of the following icons?









Appendix D

Scoring of Computer Icons

Spellcheck
Spelling
Spelling & Grammar

Save to disk
Save
Save to hard drive
To save information

½ Save disk—backup
½: Disk floppy (save)
½· Insert Disk or Save
½. 3 5 Floppy save

½: Store
½: Disk save
½: Save as

0: Hard drive
0: Normally A Drive
0: Floppy disk to excess
0. Open disk

0: Disk
0: Insert disk
0: Removable disk

Mouse/Point — **Pointer**
Point/Select — **Cursor**
Mouse Arrow or Pointer — **Pointer Arrow**
Points to desired function — **Point**
Return to point/click icon or cursor itself
Large Mouse Pointer
To choose options on screen
Use of mouse (select)

0: Click on item/Point
0· Indicator
0· Manipulate shape
0: Pick object or picture
0. To click on different icons
0: Switch to cursor or to arrow
0· Select object
0: To activate icons or put down menus

0: Mouse icon
0. Locator
0· Mouse
0: Points to Icons
0 Clicker
0: Return to Arrow
0: Arrow

Print
Printing
Print Function

½: Print/Fax

0: Fax
0· Faxing
0· Printer
0: Printer page
0: Printer select
0 Printer (activate)
0: Copy

Zoom — **Magnify**
Increase image — **Amplify**
Zoom in or out — **Enlarge**
Magnify selected section on paper or picture

½ To search for something
½ Pointer magnifier
½. Search/Zoom

½· Magnifies
½ Search
½. Find
½: Make item larger

0: Print Preview
0: Enhance
0 Print preview
0: Bigger
0: Scan
0: View
0: Search Files

0. Next page
0. Preview
0: Closer look
0. Look
0: Search
0: View Document

Cut
Edit (cut out)
Cut/Copy

0: Cut pages
0 Edit a document
0: Cut and paste

0· Clip
0: Cut sentences
0: Cut/Paste

Open file/Document **Open folder** **To Open Files** 0: Open Cycle 0: File Download 0: File 0. Folder 0: Computer Folder	**Open** **File Open**
Copy **Duplicate** ½ Paste or copy 0· Copied file 0: Print front and back 0· Page layout—All 0: Create Document 0: Show both pages 0· Copy to another Paper	½. Page 2 or copy 0. 2 sided 0: Paste copy 0. Pages 0. File 0: Double copy 0: Copy/Paste
Recycle Bin **Trash Bin** **Empty Trash** ½. Delete 0: Waste Basket 0· Garbage	**Recycle** **Trash** **Trash Can** ½: Discard
Center Paragraph **Align Text Center** **Center Align** ½. Justify Center 0· Center page 0: Change Paragraph 0 Arrange Sentences 0: Letter Form 0: Align margins in middle	**Center Text** **Center** ½: Middle Align 0· Format 0. Margin 0: Text 0: Align 0. Center document
Paste **Paste from clipboard** ½: Clipboard for copy/paste 0: Proofread 0: Paste to clipboard 0· Attached file 0: Put certain data on clipboard 0· Detach from clipboard or clipboard only	0: Clipboard 0: Notepad 0: Chart
Undo **Go back or undo** **Undo/Redo** 0: Backup one 0. Redo 0· Flip page 0: Back 0· Rotate 0. Last 0: Undelete	0 Back step 0 Make subtitle 0: Flip over 0: Go back 0. Rotate text 0. Move to 0: Restore
Question/Help **What is this** **Office Assistant** 0· Question	**Help** **Information**
Fill with Color **Shading** **Fill Color** ½: Paint/Fill Color ½: Coloring ½· Paint Fill ½. Paste color 0. Paint 0: Color 0: Color/Paint 0 Paint background	**Fill** **Fill White** ½. Change Color ½: Fill/Unfill ½: Add Color 0. Paintbrush 0: Shade 0: Font Color

New file
New document [*Word*]
New slide [*PowerPoint*]
New workbook [*Excel*]

½: New
½: File
½: Blank Document

½. New Form
½: New page or File

0: 1 sided
0: Paste
0· Page
0· Document
0· New page

0: New project
0. Page layout(s)
0: Turn page
0: New sheet
0. Next page

Draw arrow

½: Drawer
½: Draw a line/Draw line
½: Arrow Tool
½: Draw line with arrows
½. Arrow create

½: Draw
½: Draw tool
½: Line
½: Makes an Arrow

0: Drag
0. Pointer
0: Special function
0: Small mouse pointer
0· Line with Arrows
0: Arrow shape

0: Locator
0· Angle text
0: Cursor
0: Arrow
0: Auto draw

Close Application
Close Program
Close Window

½· Close page
½. Delete/Close File
½: Quit Program

0: Max/Close
0: Delete/Remove
0· Cancel or leave page
0: Open/Close

Exit
Close
Close Screen

½: Close Out
½. End Program
½. Out-Close

0· Go Back Close
0: Cancel Screen
0: Delete
0: Stop/End

Group

½: Group or ungroup

0: Graphics alignment
0 Resize
0· Move Windows
0: Apply design

Grouping

½: Combine

0. Graphic
0: Minimize
0: Size Objects