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Marksmanship Requirements from the Perspective of Combat Veterans - Volume II: Summary Report

Jean L. Dyer
Consortium of Universities of Washington

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14. ABSTRACT

This report summarizes the major findings from an Army-wide questionnaire of individual marksmanship requirements in units. The research addressed the Maneuver Center of Excellence's (MCoE) objective of developing a unit marksmanship training strategy that reflected, as much as possible, the current and near-term operational environments. A total of 1636 leaders from 14 Army branches enrolled in the Captains Career Course, Advanced Leader Course, and Senior Leader Course completed an on-line questionnaire. Overall, 94% of the leaders had been deployed at least once to Iraq or Afghanistan. Clusters of marksmanship skills were identified and linked to three groups of branches. Skills common to all branches were identified as well as those linked to branch groups and to specific branches. Infantry leaders identified more marksmanship requirements than leaders in any other branch. Skills identified reflected the leaders' combat experience. Training of some high priority, common skills will require additional training time, range upgrades, and a high level of trainer expertise. Leaders also described their pre-deployment marksmanship training plus reactions to the qualification course and to the need for a more complex course-of-fire. Findings were presented to the MCoE. Complete data are found in the main report. (ARI Research Report 1988).

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The author expresses gratitude to SFC M. McInroy who provided input to the questionnaire and insured that the Army's Centers of Excellence were aware of the importance of their students completing the questionnaire in a timely manner. The findings and recommendations in the report are derived solely from the input provided by the leaders who completed the questionnaire. The time they devoted to this effort, and the insights and detail they provided were essential to obtaining a clear understanding of why they believed certain skills were important for Soldiers in their branch. Sincere appreciation is extended to all those who participated.

MARKSMANSHIP REQUIREMENTS FROM THE PERSPECTIVE OF COMBAT VETERANS - VOLUME II: SUMMARY REPORT

EXECUTIVE SUMMARY

Research Requirement:

Marksmanship requirements are driven by operational requirements, and change as the combat environment changes, as evidenced by the changes in the Army's qualification course since World War I. New equipment also influences this requirement. To update the Army's unit marksmanship strategy, the Maneuver Center of Excellence (MCoE) saw a need to examine marksmanship requirements based on the most recent experiences of leaders from different branches of the Army. This input would enable the MCoE to identify the best use of marksmanship resources (ammunition, range upgrades, trainer requirements, courses-of-fire) across the Army. The research was distinct from most prior marksmanship research which has typically focused on basic rifle marksmanship in initial entry training. At the request of the MCoE, the United States Army Research Institute for the Behavioral and Social Sciences analyzed the questionnaire data. This report summarizes the major findings. Detailed findings are in the main report.

Procedure:

An on-line questionnaire on marksmanship requirements was made available to leaders enrolled in the Captains Career Course, Advanced Leader Course, and Senior Leader Course at the Army's Centers of Excellence from November 2012 through September 2013. A total of 1636 leaders from 14 major Army branches participated. Leaders were asked to address marksmanship requirements from the perspective of the Soldiers in their branch. Questions addressed testing non-live-fire skills as well as training live-fire skills. Additional questions were posed regarding leaders' reactions to the current qualification course-of-fire and the benefits of a more complex course-of-fire. The questionnaire also queried leaders on any pre-deployment marksmanship training they had received.

Findings:

Overall, 96% of the leaders had been deployed and this deployment experience clearly impacted their responses. A set of common marksmanship non-live-fire skills was identified for a Marksmanship Skills Proficiency Test appropriate for all Soldiers. Live-fire marksmanship skills differed substantially by branch. Three groups of branches were identified in terms of the number and type of live-fire requirements. The importance of marksmanship for these branch groups was directly linked to the likelihood that Soldiers in a branch will be involved in the close fight with enemy dismounted forces. Thus it was not surprising that Infantry leaders identified more marksmanship requirements than leaders in any other branch, and were a distinct group of their own. Despite branch differences, common live-fire requirements for all Soldiers were identified. These requirements included some skills not in the set of requirements reflected in the current qualification course-of-fire, primarily engaging moving targets, firing from different

positions, and discriminating between friendly forces, enemy forces, and noncombatants. Additional marksmanship requirements were specified for a subset of branches. Although leaders generally thought the current qualification course-of-fire was satisfactory, they suggested some changes which reflected to a great extent their combat experiences. The training of some high priority, common skills identified by the leaders will require additional training time, range upgrades, and a high level of trainer expertise. The extensive comments by leaders cited in the main report provide an excellent perspective of leaders' understanding of marksmanship skills and their feelings regarding their importance.

Utilization and Dissemination of Findings:

The findings were briefed to leaders in the Directorate of Training and Doctrine in the MCoE in June 2014 and again to a Marksmanship Working Group in August 2014. The findings are an important step in identifying critical requirements for different branches in the Army, and in that regard constitute a form of a front-end analysis and a basis for revising marksmanship strategies. The findings present challenges regarding how and whether to tailor and resource marksmanship training to different branches. The findings have implications for potential modifications to the current qualification course-of-fire, and whether a more complex course-of-fire is developed for certain branches, primarily Infantry. In addition, the leaders clearly expressed a concern regarding the quality of unit trainers, which could lead to a re-examination of how non-commissioned officers are prepared to effectively train marksmanship skills. As the goal of Army training is to prepare Soldiers for combat, the fact that the questionnaire was completed by primarily combat veterans makes their responses particularly salient.

MARKSMANSHIP REQUIREMENTS FROM THE PERSPECTIVE OF COMBAT VETERANS - VOLUME II : SUMMARY REPORT

CONTENTS

CONTENTS (continued)

Marksmanship Requirements from the Perspective of Combat Veterans - Volume II : Summary Report

Background

Marksmanship requirements for Soldiers have varied over time, adapting to the threat and changes in equipment. This summary report highlights the major findings from a questionnaire given to Forces Command (FORSCOM) leaders (Dyer, 2015) regarding marksmanship requirements for Soldiers in their branch/military occupational specialty (MOS)/Career Management Field (CMF). Leaders who completed the questionnaire were individuals in the Captains Career Courses (CCC), Advanced Leader Courses (ALC), and Senior Leader Courses (SLC) who held the ranks of Captain, Sergeant, Staff Sergeant, and Sergeant First Class. Leaders were from branches in the three functional categories of Maneuver Fires and Effects (MFE), Force Sustainment (FS), and Operations Support (OS). Although leaders from 20 branches responded, leaders from 14 branches/MOSs constituted 98% of the sample. The percentage of leaders who had been deployed to Iraq, Afghanistan, or both was extremely high (94% of 1636 respondents). Questionnaire responses clearly reflected this combat experience. In essence the effort was distinguished by two factors:

- The sample of respondents – leaders from major branches of the Army who had been deployed, and
- The subject matter – marksmanship requirements for Soldiers in active duty units (not marksmanship requirements in initial entry training).

The research reported here was conducted by the Maneuver Center of Excellence's (MCoE) Directorate of Training and Doctrine (DOTD) in 2012-2013 as a part of a larger effort to establish revised marksmanship strategies for units throughout the Army. At the request of DOTD, the United States Army Research Institute for the Behavioral and Social Sciences at Fort Benning, GA performed the data analysis. The two primary objectives were:

- Determine skills for a unit Marksmanship Skills Proficiency Test (non-live fire) for all Soldiers in the three functional categories of MFE, FS and OS, and.
- Determine individual marksmanship training requirements common to all branches/MOSs, to a group of branches/MOSs, and a specific branch/MOS.

Leaders responded to the questions from the perspective of their Soldiers' requirements, not all Soldiers in the Army. Analysis of these responses was applied to determine commonalities among the branches, as well as branch differences.

Other questions centered on two topics. Leaders were queried on marksmanship skills which were trained prior to deployment to Iraq and/or Afghanistan as well as the training they perceived as needed upon the end of their combat tour(s). They were asked about marksmanship courses-of-fire including the current qualification course and more complex courses. Some of these questions were open-ended, and leaders often responded in great detail. Collective marksmanship skills and other small arms weapons skills were not part of the research scope.

This summary report highlights the major findings. Although it presents the core data pertaining to the issues of interest to the MCoE, it does not present all the analyses or detailed data that support these findings. Nor does it present the extended leader comments to the open-

ended questions, which provide an excellent understanding of leaders' reactions to marksmanship training and their suggestions for improvement. This information is provided in the main report (Dyer, 2015). Any reader interested in understanding how deployment experience impacted the leaders' responses, in knowing the leaders' cognitive and affective reactions to marksmanship training, and/or in knowing the leader responses from a specific branch should examine this main report.

Method

The Leader Sample

The target population was leaders in active duty units from primary branches in the Army. Individuals enrolled in leader courses completed an on-line questionnaire via the Army Knowledge Online (AKO) website. Three professional development courses, the CCC, ALC, and SLC, were identified to obtain responses from the leaders defined as constituting the target population. As course size reflects the size of a branch within the Army, and if all individuals in a course and the same number of courses within each branch responded, it was assumed that the resulting numbers would be fairly representative of the Army as a whole. The branches in the target population are shown in Table 1. Some branches were excluded from the intended target population (e.g., medical, finance, adjutant general, human resource personnel, and warrant officers), although a few leaders from these branches completed the questionnaire as they were attending one of the target leader courses.

Table 1
Branches by Functional Category

Functional Category	
Maneuver, Fires and Effects (MFE)	Branch/Field Code
Infantry	11
Engineer	12
Field Artillery	13
Air Defense Artillery	14
Aviation	15
Armor	19
Military Police	31
CBRN (Chemical, Biological, Radiological, Nuclear)	74
Operations Support (OS)	
Signal	25
Military Intelligence	35
Force Sustainment (FS)	
Multi-functional Logistician	90
Transportation	88
Ammunition	89
Mechanical Maintenance	91
Quartermaster	92
Electronic Maintenance	94

The number of individuals who responded, by branch, is shown in Table 2. The primary analyses were conducted on those branches with at least 20 leader responses - a total of 13 branches (in bold in Table 2). In order to have Operations Support (OS) leaders represented in the major questionnaire analyses, the Signal and Military Intelligence leaders were placed into a single category (OS) for a total of 22 leaders. However, the responses from all leaders, officers and non-commissioned officers (NCOs), regardless of branch were tabulated in the analysis of the open-ended questions.

Table 2
Number of Leaders Completing the Marksmanship Questionnaire

Functional Category with Branch/Field				
Maneuver Fires and Effects	# Officers	# NCOs	Total #	% of Total
Infantry	104	142	246	15.0
Engineer	14	108	122	7.5
Field Artillery	3	140	143	8.7
Air Defense Artillery	1	26	27	1.7
Aviation	1	61	62	3.8
Armor	44	126	170	10.4
Military Police	70	65	135	8.3
CBRN[a]	37	34	71	4.3
Operations Support				
Signal	1	16	17	1.0
Military Intelligence	5	0	5	0.3
Force Sustainment				
Transportation	3	130	133	8.1
Ammunition	0	73	73	4.5
Mechanical Maintenance	0	258	258	15.8
Quartermaster	1	144	145	8.9
Electronic Maintenance	0	11	11	0.7
Multifunctional Logistician	8	0	8	0.5
Adjutant General [b]	0	2	2	0.1
Finance [b]	5	0	5	0.3
Other				
Medical [b]	0	1	1	0.1
Civil Affairs [b,c]	2	0	2	0.1
Total	299 (18.3%)	1337 (81.7%)	1636	

Note. The major analyses were conducted with the branches whose names are in bold font.
[a] "CBRN" is used throughout the report for the Chemical, Biological, Radiological, and Nuclear branch.
[b] These career fields were not part of the target population but a limited number of individuals in these fields were in the courses which took the questionnaire, and therefore were included in the data set.
[c] Civil Affairs branch falls under MFE, but since it is not a branch into which an officer enters the Army, it was placed under "Other."

Clearly, NCOs were the primary respondents (82% of the sample). The breakdown of the sample by rank was as follows: First Lieutenant (2%), Captain (16%), Sergeant (30%), Staff

Sergeant (38%), and Sergeant First Class (14%). Mean years of service in the Army for these different ranks were 8.13 years for First Lieutenants, 7.50 years for Captains, 7.98 years for Sergeants, 10.14 years for Staff Sergeants, and 12.99 years for Sergeants First Class.

Overall, only six percent of the leaders had never been deployed to either Iraq or Afghanistan. As shown in Table 3, the percentage of leaders with repeated deployments to Iraq was greater than the corresponding percentage to Afghanistan. In addition, overall, the mean number of total deployments was between 1.5 and 2.5.

Table 3
Percentage of Leaders With Repeated Deployments to Iraq or Afghanistan

	Percentage of Leaders	
Number of Deployments	Deployed to Iraq	Deployed to Afghanistan
Zero	22%	46%
One	32%	40%
Two	29%	10%
At least three	16%	3%

There were branch differences that merit describing. Within MFE, less than 2% of the leaders from four branches (Infantry, Engineer, Aviation, and Armor) had never been deployed. About 9% of those in Field Artillery and Military Police had never been deployed. The two branches with the highest percentage of leaders who had not been deployed were CBRN (18%) and Air Defense (44%), with Air Defense having the highest percentage of leaders who had not been deployed. With regard to FS (Quartermaster, Transportation, Ammunition, and Mechanical Maintenance), the percentage of individuals who had never been deployed ranged from 4% to 10%. Everyone in the Signal and Military Intelligence branches had been deployed at least once (although this total sample was limited to 22 individuals). Lastly, the maximum number of deployments was highest within MFE: 11 for Infantry, 10 for Aviation, and 9 for Engineer.

Although Table 3 shows that leaders had more deployments to Iraq than Afghanistan, this pattern did not exist for all branches. For the four FS branches, the average number of deployments to Iraq was 2 to 3 times the number to Afghanistan. This was also the case for Engineers, Field Artillery, and Armor. But Air Defense deployments to Iraq were six times that to Afghanistan. At the other extreme were the Infantry and Aviation branches with approximately the same average number of deployments to both Iraq and Afghanistan.

The Questionnaire

The questionnaire had five major sections. The first was on the military background of the leaders. The preceding Leader Sample section summarized the primary demographic information obtained on the leaders. The remaining four sections are described next.

Deployment training. Two open-ended questions addressed marksmanship training related to deployment which provided valuable information on skills which leaders perceived as critical. These questions were:

If you have been deployed, what marksmanship training in your unit contributed the most to your combat effectiveness?

If you have been deployed, what additional marksmanship training would have increased the combat effectiveness of your unit?

Marksmanship Skills Proficiency Test. This section explained the concept of a Marksmanship Skills Proficiency Test (a non-live-fire test). The intent was to determine which skills were viewed as important for Soldiers in most of the branches in the Army and therefore should be included in an Army-wide test. Leaders were asked to indicate the skills they believed should be in such a test for Soldiers in their branch or MOS. The fifteen skills covered in the questionnaire are listed below. Each leader simply had to mark whether each skill should be in a proficiency test for Soldiers in their branch/MOS. Another item was whether a test of knowledge should be included (Yes or No). They were also asked to list any additional skills to include in such a test, if a proficiency test was a good idea (Yes or No), and to cite any additional comments regarding a proficiency test. The skills listed in the questionnaire were as follows:

Assemble/disassemble carbine/rifle
Perform a function check
Load magazine
Change magazines
Perform immediate action
Correct a malfunction
Clear weapon
Demonstrate correct firing positions (prone supported, prone unsupported, kneeling)
Mount/remove optic
Boresight an optic with borelight
Mount an aiming light
Boresight an aiming light
Demonstrate proper use of sling for firing
Determine dominant eye
Determine sight adjustment given a diagram of grouped, but not zeroed rounds on a 25 m target

Marksmanship skill requirements. This section was on marksmanship skill requirements, specially the individual marksmanship skills which the leaders thought Soldiers in their branch/MOS should be able to perform without assistance. In this case, the purpose of the questions was to identify both common requirements and branch/MOS specific requirements. Seven areas were identified, for a total of 44 skills. The skills in each of these seven areas are in Table 4. Skills ranged from those trained in basic rifle marksmanship (e.g., zero weapon at 25 m) and in advanced rifle marksmanship (e.g., fire with night vision goggles and aiming lights), to even more advanced skills (e.g., hit pre-specified multiple lethal zones on a target).

Table 4
Marksmanship Skills in the Questionnaire

Skills in Each Skill Category	
Zero Weapon (6 skills)	**Precision firing (5 skills)**
Zero weapon with sighting system organic to unit	Adjust sight picture for firing conditions such as wind
Zero in combat gear	Hit target in a specified lethal zone (vs. just hitting a target)
Zero weapon with backup iron sights	Hit target in multiple-specified lethal zones
Zero at 25 meters	Hit moving targets
Confirm zero at distance	Hit targets at elevations above or below firer's position
Zero at distance (wo/ firing at 25m first)	
Firing Positions (9 skills)	**Special Equipment (6 skills)**
Fire from prone unsupported position	Hit targets in course of fire in combat gear
Fire from prone supported position	Qualify with weapon in combat gear
Fire from kneeling position	Hit targets at night using aiming lights & night vision goggles
Fire from standing position	Hit targets at night with thermal weapon sight
Fire around or from behind barricades using appropriate firing positions	Fire with protective mask
Fire from windows/enclosures	Fire with a sling
Fire under stress	
Modify firing position to take advantage of man-made objects (e.g., under a car)	
Hit Targets at Different Distances (5 skills)	**Other Skills (7 skills)**
Hit targets at distances less than 25 meters	Switch between primary and alternate weapon to engage targets
Hit targets at 25 to 100 meters	Quickly change magazines
Hit targets at 100 to 200 meters	Proficient in reacting to malfunctions
Hit targets at 200 to 300 meters	Hit targets at night with unaided eye
Hit targets at extended distances (beyond 300 meters)	Short range marksmanship skills
	Skills with different firing modes (e.g., semi, burst)
	Flexibility to shoot with nondominant hand
Target Acquisition Skills (6 skills)	
Acquire all targets in sector of fire	
Discriminate between friendly forces, threat personnel, and noncombatants	
Hit single timed targets in sector of fire	
Hit two timed targets in sector of fire	
Hit three or more timed targets in sector of fire	
Hit targets with shorter exposure times than in current courses of fire	

The instructions stressed that the leaders were to respond with regard to Soldiers in their Branch/MOS/CMF. The instructions also stressed that if they believed a skill was a requirement, then that meant training resources should be allocated to train and sustain that skill. For each set of skills the general instructions were:

> The last part of the questionnaire asks you to identify the marksmanship skills which you believe **Soldiers in your branch or MOS/CMF should demonstrate proficiency (can perform without assistance, can meet unit standards).** If you think a skill is required, the assumption is that Soldiers must be trained and sustained on this skill, and a marksmanship strategy should allocate the necessary resources for this training.

The question format is shown below using the first set of skills on zeroing. Questions on the other sets of skills followed the same format.

> ZERO WEAPON: Which zeroing skills should be proficiency requirements for Soldiers in your branch or MOS/CMF?
>
> *Instructions: Check all the skills that apply.*
> (A checklist of six zero-related skills followed.)

Leaders were also asked to list any other skills required by Soldiers in their Branch/MOS.

Other questions. The leaders were asked the following four questions about courses-of-fire.

If Soldiers in their branch should be proficient in executing complex courses-of-fire such as combat field fire which require skill integration (Yes or No).
If the current qualification course should be changed, and if so, to list the desired changes.
If there should be a requirement for a more complex course-of-fire in addition to the current qualification, and if so, to list the core skills for such a course.
If a system that provides immediate feedback to the Soldier on shot location (hit and miss) would be beneficial (Yes or No).

At the conclusion of the questionnaire, leaders were able to provide additional comments they wished to make regarding the training of and resourcing of marksmanship skills in units.

Results

Marksmanship Deployment Training

The two questions on deployment training had the highest response rate of all open-ended questions, with 67% of the leaders describing training received, and 52% elaborating on needed training that was not received. For both questions, the branch with highest percentage of leaders who commented was Infantry (81% and 71% respectively). The branch with the lowest percentage of leaders who commented was Air Defense Artillery (41% and 26% respectively).

Basic Rifle Marksmanship (BRM) training and Advanced Rifle Marksmanship (ARM) training were the most common types of training received prior to being deployed. Leaders from 11 to 15 branches indicated that they just did “BRM” or that they zeroed their weapons and/or

fired qualification. Other leaders (from 15 branches) stated they did a lot of live fire, with little detail provided on the type of live fire. However, Infantry leaders indicated they often practiced on a known distance range. The use of a marksmanship simulator such as the Engagement Skills Trainer (EST) was cited infrequently.

With respect to ARM, the most common training was some form of short range marksmanship (SRM) training including reflexive fire (leaders from 16 branches). Long range marksmanship (LRM) training was cited less frequently, but primarily by Infantry leaders. Stress shoots was the third type of ARM training cited by leaders as being important. Leaders, primarily Infantry, cited training on unconventional or modified firing positions, barrier shooting, training on ballistics, and high-angle or elevated shooting (prior to Afghanistan). Aviation and Military Police leaders cited transition fire training (switching from primary to secondary weapons). Leaders from most branches (10) also indicated that training on crew–served weapons and/or the other weapons organic to their unit was critical. Lastly some leaders, primarily Infantry, stated that their unit or individuals within their unit received special training from either Army courses or private courses to ensure the desired skills were acquired prior to deployment. Infantry leaders cited the most extensive and diverse forms of marksmanship training. These leaders also provided the most detailed comments on deployment training.

Examples of detailed leader comments are given below to better convey what leaders said about pre-deployment marksmanship training that contributed to combat effectiveness:

Ammunition. *On my deployments to Iraq, the pre-deployment marksmanship training increased as my number of deployments increased. For example, on my first deployment we trained at home station and then again at Kuwait. The 2nd and 3rd rotations were similar but with more advanced level of marksmanship, such as CQB, reflexive firing and advanced optics. My only pre-deployment marksmanship training for Afghanistan was simple qualification range.*

Armor. *Having an NCO driven shooting program that allowed for creative ranges. We would utilize civilian shooting schools to get guys tight on both distance shooting as well as CQB. We were also allotted FRANG ammo for use on steel targets (for instant target feedback).*

Armor. *My unit was at the range for months before we deployed – every day and some nights. It got to the point that we all shot expert and were fast in handling stoppage issues. We fired in all types of uniforms, i.e., soft cap not IBA/ACH, with IBA/ACH. Also we drilled on all shooting positions, prone, on our side, around corners, from windows, kneeling, standing, out of the back of the LMTV. My 1SG kept us up all day and had us shoot all night, then again the following day. In short my 1SG made sure every Soldier was tactically proficient in any situation in any position that we might have to fire our weapon.*

Engineer. *Short Range Marksmanship in Iraq: The enemy TTPs in Iraq were different -- they wanted to get in close and ensure their way in to paradise. The ability to react quickly and effectively to near ambush with effective and lethal fires was not only necessary but key to bringing many of our boys home.*

Infantry. *High angle fire and stress shots. Other than that multiple platoon LFX. This provided us with training we needed to be able to conduct combat operations in Afghanistan. Weapons, and more important, ammo is completely necessary for you to be able to train your Soldiers. Also you must have more and more ammo. Ammo is a key asset to training and without it we cannot train on weapon systems. Different training areas are also necessary because this puts the Soldier in unfamiliar areas and adds another stress to the LFX. Range Control is also a huge help with providing Soldiers with what they need.*

Infantry. *Stress shoots, alternate firing positions (doors, walls, rooftops), customized shooting ranges (qualification range using a controlled pair for each target), qualification range off-hand shooting, buddy team live fires with UBL and controlled pair required for each target. Actually shooting in difficult situations helped immensely. Standard qualification is good to maintain familiarity, but the types of ranges we did before deployment were more focused on shooting in a real firefight. Reflexive fire was less relevant. We did it once in conjunction with a shoot house. One full day was sufficient.*

The second question was on pre-deployment training the leaders perceived as needed but did not receive. That fewer leaders commented on this question versus the training they received, indicates that some felt pre-deployment marksmanship training was adequate. The emphasis on BRM training decreased substantially indicating that, in general, leaders felt the pre-deployment BRM training was adequate. The relative emphasis on ARM training was about the same, but the specific emphasis on SRM skills decreased substantially while the need for more LRM training increased. The need for training on crew-served weapons remained steady, as did the need for special training such as squad designated marksmanship training (Armor, Engineer and Infantry leaders). Lastly, leaders cited the need for more live-fire exercises, indicating that the live-fire training they did was not sufficient.

Examples of the different types of comments made regarding training needed but not received are presented next. These examples are not a "representative sample" of comments but depict the diversity of comments made.

Armor. *ARM training such as learning how to shoot moving targets and adjusting for degraded shooting conditions such as extreme heat and wind.*

Armor. *More SRM and CQB training; this is the most dangerous type of engagement we can do. On several occasions it was usually myself and one or two others entering and clearing a building in Iraq. I must be able to accurately and quickly engage multiple targets and eliminate the threat the first time.*

Armor. *More training with ACOG and TWS.*

Aviation. *We needed more training on using the NVG firing techniques. A lot of the junior enlisted only fire weapon at ranges. To put them in a live fire conditions, the junior and some of the senior enlisted were not comfortable under these conditions making it unsatisfactory.*

Engineer. *Different styles of ranges, not just qualification (paper target), but popup target ranges, moving targets, paintball course in urban area.*

Infantry. *Greater quantity of stress shoots, more flexibility to conduct squad live fires, especially at night. Also more marksmanship training associated with patrolling. Also being able to use our accessory equipment (like thermals) synchronized as in an SOP. Without time to train (for my earlier deployments), focus was on a basic task, then COIN. No high level training or evaluation contributed to individual mastery of skills with all the new tech that came even while in country.*

Infantry. *Additional time on the KD range would have been advantageous. Any practice engagements at 500 meters would have increased our ability to effectively return fire.*

Infantry. *ACOG training. We received them on the eve of our deployment and never got to train on and go to ranges with them. I was not confident in using the ACOG system.*

Military Police. *Firing from corners and from behind cover.*

Quartermaster: *Fired crew served weapons for practice once and our assigned weapons once for qualification during the entire deployment. I believe that we should have gone to the ranges more.*

In answer to both deployment questions, leaders also cited collective live-fire training as being important in pre-deployment training. Convoy live-fire, shoot houses, and military operations in urban terrain accounted for 75% of these comments. However, the total number of comments regarding collective fire training decreased by 50% in response to training needed but not received.

Detailed comparisons on the deployment training received versus the deployment training desired are found in the main report (Dyer, 2015). A tabular summary of the comments to both questions is at Appendix A of this report.

Marksmanship Skills Proficiency Test

The questionnaire was used to identify which non-live-fire marksmanship skills should be included in a proficiency test for all Soldiers. Three analytic approaches were used to examine this issue. The 15 skills listed in the questionnaire as well as the knowledge test were included in these analyses. All three approaches were based on the percentage of leaders from the primary branches who marked the skill as being important for their specific branch. Because of the small sample, responses from Military Intelligence and Signal leaders were combined into the OS functional category for these analyses. Appendix B presents the leader percentages by branch for each of the 15 skills.

The first approach was called the equal branch approach. It used the leader percentages and set 70% as a cut-point for leaders viewing the skill as critical. For each skill, the number of

branches where the leader percentage was at least 70% was tallied. Then skills where at least half of the 13 branch percentages met the 70% criterion were identified for the test.

The second approach was called the weighted branch approach. It weighted the percentages by the relative size of each branch within the Army, based on 2012 population numbers from the Defense Manpower Data Center. It is acknowledged that this procedure used the leader data as a proxy for how a broader sample of Soldiers within each branch would respond. This approach was deemed important as the intent is for all Soldiers in the Army to take the test. However, since branches are not of equal size (e.g., more individuals are in the Infantry branch versus the CBRN or Signal branches), weighting the responses by size instead of equally was a valid alternative approach. If leaders in the different branches agreed, then the result of the two approaches would be the same. A weighted average of at least 70% was used as the cut-off for skills to include in the test.

The third approach was a hierarchical cluster analysis.[1] Three clusters of skills emerged from this analysis. In addition, the comments made by leaders on other skills to include were considered. No new skills were identified, but leaders made recommendations regarding the scope of some specific skills.

Table 5 presents the results and the skills recommended (and not recommended) for the test. There was high consistency among the three analytic procedures. These results indicate that all nine skills in the top portion of Table 5 from Perform Immediate Action through Load Magazine, plus a knowledge test, should be considered for a Marksmanship Skills Proficiency Test. Load magazines was slightly below the cut point for the equal branch and weighted branch approaches, but was retained for consideration given that changing magazines was included. Considerably less agreement among the leaders from the different branches was shown for the six skills in the bottom portion of the table, and were, therefore, excluded. Leaders thought the knowledge test was important because Soldiers know what their weapon does but do not know how it operates. They also stated that the knowledge test need not be highly technical.

Although 80% of the leaders favored the proficiency test, some leaders indicated why they thought a test was not necessary. The primary reasons were: the skills are covered by good units during preliminary marksmanship instruction, many skills are in the Expert Infantryman Badge test, it would create more paperwork, and/or it could waste valuable training time. Leaders also commented on how such a test should be implemented. Primary comments were on quality control procedures, ensuring the test does not become a “check-the-box” event, who should develop such a test, who certifies test procedures and results, and training NCOs so they can prepare Soldiers for a test. Some leaders from different branches expressed concern that not all NCOs know how to perform the tasks themselves and therefore doubted the ability of the NCO Corps to properly train the skills. Leader suggestions regarding the execution of such a test should be seriously considered prior to implementation.

[1] This was a hierarchical cluster analysis using Euclidean distance and complete linkage method to form the clusters. Three distinct clusters were identified based on the tree diagram (dendogram), and are indicated by the A, B, and C labels in Table 5. Cluster C was the most diverse of the three. Although the analysis revealed two major clusters (C versus A and B) as a single solution, the tree diagram indicated that the distinction between Clusters A and B was warranted.

Table 5

High to Low Ordering of Skills for a Marksmanship Skills Proficiency Test: Summary of Equal Branch, Weighted Branch, and Cluster Analysis Approaches

Skills in Questionnaire	Analytic Approach		
	Equal Branch (# Branches: > 70%)	Weighted Branch (Weighted %)	Cluster Analysis (Clusters: A, B, C)
Skills Recommended			
Perform Immediate Action	13	87	A
Correct a Malfunction	13	87	A
Perform Function Check	13	86	A
Clear Weapon	13	84	A
Assemble/Disassemble Rifle	12	81	A
Demonstrate Firing Positions (leaders recommended testing positions beyond the 3 in qualification)	9	73	B
Change Magazine (leaders recommended testing tactical & rapid magazine changes)	8	74	B
Determine Sight Adjustment	7	71	B
Load Magazine [a]	6	68	B
Skills Not Recommended			
Boresight Optic	2	59	C
Determine Dominant Eye	1	57	C
Demonstrate Use of Sling	0	53	C
Mount/Remove Optic	0	51	C
Boresight Aiming Light	0	49	C
Mount Aiming light	0	45	C
Include Knowledge Test (leaders recommended questions on zeroing with and without optics and ballistics)	7	71	B

Note. With the equal branch and weighted branch approaches, eight skills plus the knowledge test met the criterion. Load magazine was borderline with both approaches. Although the rank order of three skills with the weighted approach varied slightly from the equal branch approach, all three skills were above the cut points. Lastly, the three groups in the cluster analysis showed that the highest ranked skills were in one cluster, the lowest ranked skills in the bottom cluster (below the cut points of the other two approaches), and the remaining skills were in the middle, but above the cut points (with one exception of load magazine).

[a] Borderline for inclusion of skills in the test with equal branch and weighted branch approaches.

Marksmanship Requirements for Branches

The second primary objective of the research was to determine individual marksmanship training requirements common to all branches/MOS, common to groups of branches, and specific to a branch/MOS. In other words, the analysis focused on identifying the clusters of

marksmanship requirements that were linked to groups of branches, based on the leader responses. This information could then be used to design unit marksmanship training strategies, which in turn would impact training resources and other training requirements. Although the core set of data for the analysis was the percentage of leaders by branch who specified each skill as a requirement for their Soldiers, data from the open-ended questions on courses-of-fire and deployment training were also considered in making the final recommendations regarding which skills are requirements for individual branches or groups of branches.

Branch groups. Table 6 presents a global picture of the major distinctions among the branches in terms of the number of perceived marksmanship requirements. In Table 6, the total number of skills for each branch sums to 44; but the number of skills is divided among three categories, depending on the percentage of branch leaders who marked it as a requirement. If at least 80% of branch leaders marked a skill as a requirement, it was tallied in the "High" column. At the other extreme if less than 60% of branch leaders marked a skill as a requirement, it was tallied in the "Low" column. The branches are ordered from high to low by the number of skills in the High column. Thus Infantry leaders marked 28 of the 44 skills as a high requirement; while none of the 44 skills was marked as a high requirement by the Transportation leaders.

Table 6
Number of Marksmanship Skills Marked as a Requirement by a High, Moderate and Low Percentage of Leaders From Each Branch (ordered from high to low by number of skills marked by at least 80% of the leaders)

	Number of Skills Marked by Leaders in Each Percentage Category		
Branch/Field	High: At Least 80% of Leaders	Moderate: 60% to 80% of Leaders	Low: Less Than 60% of Leaders
Infantry	28	11	5
Engineer	21	14	9
CBRN	17	21	6
Military Police	15	20	9
Armor	13	19	12
Field Artillery	10	22	12
Mechanical Maintenance	6	28	10
Aviation	6	26	12
Operations Support	5	14	25
Ammunition	3	28	13
Air Defense Artillery	2	12	30
Quartermaster	1	29	14
Transportation	0	23	21

Note. Total number of skills was 44. The numbers in each row (branch) sum to 44.

Table 6 shows there were clear differences among the branches. Although 80% is a high percentage, it served to highlight that the leaders had distinct perceptions of marksmanship skill requirements even though most were combat veterans. However, the summary counts in Table 6 did not directly indicate which branches were most similar and which skill requirements were relatively common versus reserved for specific branches.

Two analytic approaches were applied to identify branch groups; one was based on the tallies in Table 6 and the other was a hierarchical cluster analysis.[2] Based on the tallies in Table 6, two breaks in the percentages appeared using the 80% cut point: a break after Infantry and one after Field Artillery. This yielded three groups of branches by the number of marksmanship priorities. First, Infantry was separate from the other branches. The next group of branches included five branches from the MFE functional area: Engineer, CBRN, Military Police, Armor and Field Artillery. The third group included eight branches from the three functional areas: Mechanical Maintenance, Aviation, Operations Support (Military Intelligence and Signal), Ammunition, Air Defense Artillery, Quartermaster, and Transportation.

The cluster analysis, applied to the leader percentages on the 44 skills, also yielded three groups of branches, with Infantry again being distinct. The second group was similar to that described with regard to Table 6, with the only difference being that Mechanical Maintenance was included in the second group with the Engineer, CBRN, Military Police, Armor, and Field Artillery branches.

The branch groups identified in the cluster analysis were the ones used for identifying marksmanship requirements. For purposes of this report, these three groups are referred to as the High, Moderate, and Low Requirements groups and are defined as follows:

- High Requirements: Infantry. Infantry had the most requirements.

- Moderate Requirements: Engineer, CBRN, Military Police, Armor, Field Artillery, and Mechanical Maintenance

- Low Requirements: Aviation, Air Defense Artillery, Operations Support (Military Intelligence and Signal), Ammunition, Transportation, and Quartermaster. These branches had the least requirements.

It was not assumed that the individual marksmanship skill requirements identified for branches in a specific group would be perceived as equally important by leaders in each branch.

Marksmanship skills. What skills did leaders think were important? Table 7 indicates how leaders perceived the importance of the skill sets. Within each set and for each branch, the percentage of leaders who indicated each skill was a requirement was calculated (see Appendix B). Then the average of these percentages was computed to present an overall picture of the importance of the skills within each set by branch. The average percentages are in Table 7.

[2] A hierarchical analysis using Euclidean distance and the complete linkage methods was applied to the 44 marksmanship skills to identify groups of branches.

The percentages in Table 7 clearly indicate that leaders in different branches had distinct views of the marksmanship requirements for their Soldiers. In examining the MFE and FS functional categories, the FS branches were more homogenous than the MFE branches. Within MFE, the lowest percentages occurred in the Air Defense Artillery branch. The highest percentages within MFE were in the Infantry branch and followed by the Engineer and CBRN branches. In fact, considering all functional categories, the highest average percentages were in the Infantry, Engineer, and CBRN branches. The branches with the lowest percentages (approximately 50%) were Military Intelligence and Signal, which generated the OS percentages. Selected skills were also examined to determine patterns in skill priorities. These results are presented after Table 7.

Table 7
Average Percentage of Leaders by Branch Indicating Skills in Skill Set Were Marksmanship Requirements

	Skill Sets: Average Percentage of Leaders						
Functional Category and Branch	Zeroing 6 skills	Firing Position 9 skills	Target Distance 5 skills	Target Acquisition 6 skills	Precision Fire 5 skills	Equip-ment 6 skills	Other skills 7 skills
MFE							
Infantry	71	86	84	79	78	69	75
Engineer	75	81	80	72	68	65	76
CBRN	75	79	77	72	69	71	73
Armor	67	78	72	68	65	61	69
Field Artillery	69	76	73	70	68	62	69
Military Police	60	71	70	59	57	54	66
Aviation	66	73	71	63	58	53	65
Air Defense	53	64	60	57	53	51	48
OS [a]	57	58	55	54	48	43	51
FS							
Transportation	59	65	62	57	59	46	50
Ammunition	66	71	70	63	60	46	66
Mech Maint [a]	69	76	74	66	68	51	67
Quartermaster	61	69	68	60	63	51	59

[a] OS is a functional category with Military Intelligence and Signal leaders. "Mech Maint" refers to Mechanical Maintenance.

High priority individual skills. The data were examined to identify individual skills marked by a very high percentage of leaders overall. A high percentage for a skill was defined as a weighted branch average of at least 80% (see Appendix B for weighted branch averages for all skills). Table 8 presents these results and also identifies branches where the leader percentages were at least 90%. Seven individual marksmanship skills had a weighted average of at least 80% of the leaders across the branches. These skills involved basic zeroing skills, hitting targets at relatively short distances, skill in acquiring targets in the sector of fire, discriminating between friendly forces, enemy forces, and noncombatants, and lastly hitting moving targets. Of

interest, is that 90% or more of the Infantry and Engineer leaders perceived about half these tasks as critical requirements for their Soldiers.

Table 8
Individual Marksmanship Skills Marked as a Requirement by a Weighted Branch Average of at Least 80% of Leaders

Marksmanship Skill	Weighted Average %	Branches Where at Least 90% of the Leaders Stated Skill was a Requirement
Hit targets at 25 to 100m	86	Engineer 95%; CBRN & Mechanical Maintenance 91%
Hit moving targets	85	Infantry 95%; Field Artillery 90%
Hit targets at 100 to 200m	84	Engineer 93%; Infantry 90%
Zero at 25m	82	No branch
Acquire all targets in sector of fire	81	Engineer 92%
Zero sight organic to unit	81	Infantry 91%
Discriminate between friendly forces, threat personnel, & noncombatants	81	Infantry 93%

Note. Branches with less than 70% were Air Defense for zero sight organic to unit, and acquire all targets in sector of fire, and Transportation for zero sight organic to unit, acquire all targets in sector of fire, and discriminate between types of forces.

Low priority individual skills. Low priority skills were identified as well; those skills with a weighted branch average of less than 60%. Eleven skills emerged, which typically addressed very specific skills including some advanced marksmanship skills. Average percentages ranged from 59% to 36%. These skills ordered from high to low, according to leader percentages, were as follows: Flexibility to shoot with non-dominant hand (59%), zero in combat gear (57%), adjust sight picture (56%), fire with sling (53%), hit 3 or more timed targets (53%), hit targets with shorter exposure times (53%), hit targets in multiple lethal zones (52%), hit targets at night with unaided eye (49%), hit targets at extended distances (46%), fire with mask (37%), and zero at distance initially (36%).

Firing in combat gear. Three items dealt with shooting in gear: whether Soldiers should zero in gear, whether they should shoot courses-of-fire in gear (e.g., known distance, field fire), and whether they should qualify in gear. For these skills, Infantry and Armor leaders differed from the other leaders. A low percentage (45%) of the Infantry and Armor leaders indicated Soldiers should zero in gear whereas a high percentage said Soldiers should fire/practice in gear and qualify in gear (80% for Infantry; 70% for Armor). No such distinction was made among the three skills for leaders in the other branches. Comments to other questions by some Armor and Infantry leaders provided insights into why few thought Soldiers should zero in gear (e.g., "no gear for zeroing – never," no gear for zeroing", "have learned not use gear when zeroing").

Firing positions. Nine firing positions were in the questionnaire (see Table 4). All positions were marked by a similar average of percentage of leaders (74%). Thus no single firing position stood out as being more important than the others. Rather it appeared that leaders believed Soldiers should be skilled in a variety positions, beyond the three used in current

qualification (i.e., prone supported, prone unsupported, and kneeling unsupported). The other trend in the data was that for each firing position the branch with the highest percentage of leaders marking it as a requirement was Infantry. The Engineer leaders were second highest on seven of the nine firing positions.

Firing distances. Lastly, the distances at which leaders thought Soldiers should hit targets were examined by the three branch groups identified previously. These results are in Table 9. There was a strong relationship between the branch groups and distance to target. In progressing from near to far ranges, the High Requirements (Infantry) group leader percentages were consistently the highest, and Low Requirements group leader percentages were consistently the lowest. In addition, for each branch group, the percentage of leaders marking engagement distances as a requirement decreased as the distance increased.

Table 9
Average Percentage of Leaders in Each Branch Group Indicating Whether Hitting Near or More Distant Targets Was Required

Distance to Target		Branch Group: % Leaders		
		High Requirements [a]	Moderate Requirements	Low Requirements
Close-in	200 m and closer	89	84	76
Mid-range	200 to 300 m	90	73	64
Long range	beyond 300 m	67	44	36

[a] Infantry branch only.

In making final determinations regarding which skills should be a requirement for branches in each of the three groups, the general guideline was to use 70% of leaders as the cut point. The percentages in Table 9 indicate that only close-in targets were a priority for all leaders, given the guideline of 70%. Hitting the 200 to 300 m targets did not meet this guideline for the Low Requirements group. However, these results are somewhat inconsistent with the reactions to the open-ended question on whether the qualification course should be changed, where at least 75% of the leaders (including leaders in the Low Requirements group) indicated it should not change. However, some comments were made to the effect that hitting the 250 m target and particularly the 300 m target should not be required. This inconsistency (no change to qualification versus hitting 200 to 300 m targets not being a priority) could be a statistical artifact resulting from many leaders simply electing not to comment on open-ended questions. In general, leaders from the Low Requirements Group were the least likely to provide comments to all open-ended questions, and in this case no response to the qualification question was defined as “no change” to qualification; otherwise desired changes should have been listed.

Qualification and other courses-of-fire. A summary of leader comments to the courses-of-fire questions is provided before the findings which link branch groups to clusters of skills. This is because these comments provided insights into the skills leaders thought were critical and were also used in making the final determination of skill clusters.

Although the dominant response was not to change the current qualification (75% of the leaders, Department of the Army [DA], 2011), many leaders suggested changes which warrant consideration. The primary areas cited were including more firing positions primarily with barricades, incorporating malfunctions and rapid magazine changes, using varied targetry (moving targets, unpredictable targets), and target distance with leader comments split at whether Soldiers should fire beyond 200m. Except for shooting within 200 m, these suggestions imply a more complex course, but they were made by only about 25% of the leaders. Comments on standards were that they were too easy for Soldiers in active duty units. Leaders also acknowledged that units often trained to the test (i.e., qualification), and therefore the skills demanded of Soldiers in units were often limited to the test and additional marksmanship skills were not gained.

The questionnaire did not have a checklist of skills to include in qualification. As leaders were not directly queried about the applicability of specific skills to qualification (an approach similar to what was done for the Marksmanship Skills Proficiency Test), it is not possible to know what the leaders would have said. So the question remains regarding whether changing qualification is the best way to increase Soldier competency with the additional skills which the leaders thought were critical.

Regarding a more complex course-of-fire, only one branch, Infantry, had more leaders favoring such a course than those who did not. Even in response to the qualification course question, Infantry leaders commented that Infantry needed a more complex course in addition to qualification. Comments by all leaders on the skills to stress in such a course were very similar to the suggestions on how to change qualification. Specific skills cited were: using more firing positions, hitting moving targets, shooting while moving, discriminating hostile from nonhostile targets, having short-range and long-range skills, firing with non-dominant hand, transitioning between weapons, reacting to malfunctions, changing magazines rapidly, and shooting under stress. Obviously, more training resources, including time, would be required for these skills. Why a more complex course? The primary reasons were that leaders believed Soldiers needed such skills to react to different combat situations and they would benefit greatly from the increased confidence that would result.

The current Combat Field Fire (CFF) scenario (DA, 2011, Dyer et al., 2010), favored by 80% of the leaders, includes some of the more complex skills cited by the leaders. Specifically CFF includes firing from barricades, reacting to malfunctions, changing magazines quickly, and engaging up to four targets in an array. It also requires more than one shot for some targets and firers must be aware of the ammunition available as they determine when to change magazines. It is a different dynamic than qualification in that performance in the early tables of CFF impacts performance in later tables, whereas that is not the case with the qualification course-of-fire.

There was another trend in the data that implies leaders felt that marksmanship scenarios and training on more than qualification skills were needed – not necessarily as a “qualification” course but scenarios that allow Soldiers to learn other skills and gain confidence, and enable leaders to have good feedback on the proficiency of Soldiers in their units. Specifically, from a post-deployment perspective, the leaders cited the need for more live fire. However, the type of

live-fire scenarios desired was not cited, perhaps because they elected not to say or because they were unable to specify exactly what was needed.

One consideration in this regard is the need to have feedback on the location of rounds relative to a target, such as that provided via known distance (KD) and location of miss and hit (LOMAH) ranges. Only Infantry leaders cited the use of KD ranges for deployment training; 82% of the leaders surveyed favored a range system such as LOMAH. Current ranges simply provide hit or miss data, but as Liwanag (2009) stated about the popup target configuration, "it was never intended to be, nor is it suitable for, providing the feedback necessary for diagnosing problems, correcting a faulty zero, or gradually refining or sharpening a beginner's shooting ability" (p. 29). Shooting on either a KD and LOMAH range provides this feedback, essential to the development and sustainment of basic and advanced skills. Marksmanship training scenarios developed for such ranges would seem to fill a gap in current training strategies in some units which were stated to consist primarily of the BRM skills of zeroing and qualification, and would allow a more accurate assessment of firer expertise. Such scenarios would also help to train and sustain basic marksmanship skills, which are highly perishable even from Basic Training (BT) to the end of Advanced Individual Training (AIT) (Cobb, James, Graves & Wampler, 2009a, 2009b). Cobb et al. found that the "go" percentage on rifle qualification upon graduation from AIT had declined substantially from BT, to a level that considerable retraining would be needed in units to bring Soldiers back to their initial qualification scores in BT.

Branch groups linked to clusters of skills. Figure 1 illustrates the overall relationship between the branch groups as defined previously and the skill requirements. The 44 skills were linked to the branch groups as follows:

- Skills required by all three branch groups
- Skills required by two of the three branch groups
- Skills unique to a branch
- Skills not perceived as requirements by any branch

A sizeable percentage (43%) of the 44 skills was considered basic and core to all branches. The High Requirements (Infantry) and Moderate Requirements branch groups were linked to an additional 27% of the 44 skills, which were more difficult. Infantry had an additional 16% of skills, the most difficult skills and ones that give them an even greater capability in an operational environment. The complexity and difficulty of skills increased from the basic cluster to the additional skills for the High and Moderate groups, and finally to the additional skills for just the High Requirements group. CBRN and Military Police each had one requirement specific to their branch.

Tables 10 through 13 present the individual skills associated with the different branch groups. The complete rationale for linking skills to branch skills is found in the main report (Dyer, 2015). The links were based on a cluster analysis[3] of the skills as well as careful examination of the percentage of branch leaders who marked each skill as a requirement. The general guideline was to link a specific skill(s) to a branch or group of branches when 70% of the

[3] A hierarchical cluster analysis using Euclidean distance and the complete linkage method was applied.

leaders marked the skill(s) as a requirement. Some explanatory comments on the resulting skill clusters are also in Tables 10 through 13.

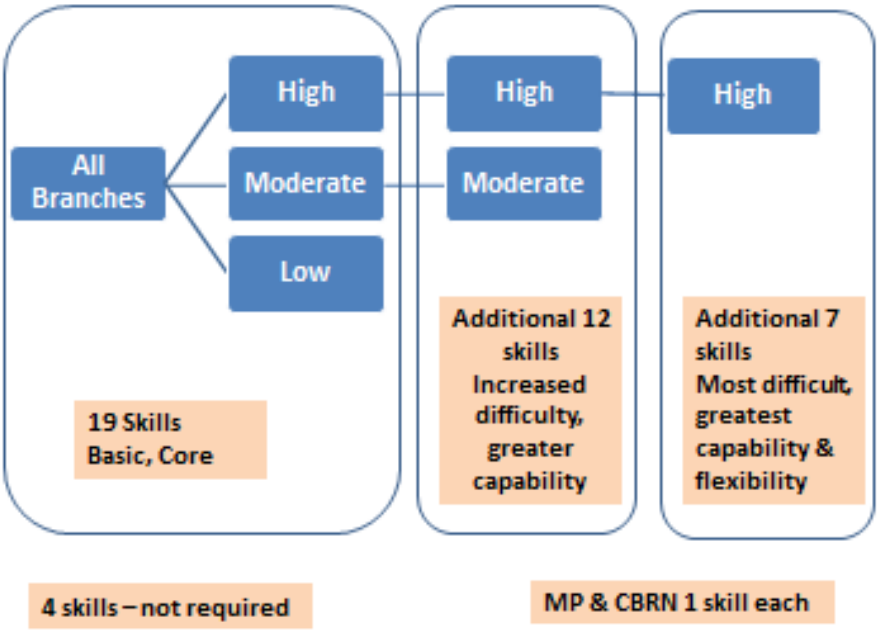

Figure 1. Relationship between skill clusters and branch groups (High Requirements Branch Group, Moderate Requirements Branch Group, and Low Requirements Branch Group).

Table 10
Marksmanship Skill Requirements Applicable to All Branches

Skill Category and Skill (19 skills)	Comments
Zeroing	
• Zero sight organic to unit; zero BIS; zero at 25 m	
Firing distance	
• Fire at less than 25 m; from 25 to 100 m; from 100 to 200 m	• Targets beyond 200 m were not included based on the leader percentages. However, 80% of the leaders said qualification should not change.
• Short range skills	
Firing positions	
• Prone supported & prone unsupported	
• Kneeling	• In response to the qualification question, many leaders indicated this should be kneeling supported not unsupported, more typical of combat. Kneeling supported was typically cited with respect to firing from barricades.
• Other firing positions: Standing, Firing behind or around obstacles	• Category combines several firing positions as leaders commented on the need to train on positions other than those in qualification; firing from obstacles or barricades was frequently mentioned by many leaders, plus standing.
Basic Skills	
• React to malfunctions	
• Change magazines	
Precision firing	
• Hit moving targets	• Training Soldiers to hit moving targets would require range upgrades.
Target Acquisition	
• Hit single targets; Hit double targets	
• Discriminate among targets	• Additional and/or different targets would be needed for target discrimination.
• Acquire targets in sector of fire	

All the skills cited as high priority requirements in Table 8 were included in the basic or common set of skills in Table 10. Additional requirements beyond what is in current qualification or in BRM training were: hitting moving targets, discriminating among targets, acquiring all targets in sector of fire, and skill with other firing positions. However, the common set above did not include firing at 250 m and 300 m targets which is in the current qualification course-of-fire.

Table 11
Marksmanship Skills Applicable to the High and Moderate Branch Groups

Skill Category and Skills (12 skills)	Comments
• Qualify in gear and train in gear	
• Confirm zero at distance	
• Hit targets with assigned night optics (night vision goggles [NVGs] & aiming lights[ALs]; thermal weapon sight[TWS])	• Requirement depends on which units have NVGs and aiming lights and/or TWS. Live fire with TWS requires "thermal" targets on ranges.
• Hit targets at 200 to 300 m, Hit targets at different elevations	• Results reflect leader responses. However, targets at 200 to 300 m could be a requirement for all Soldiers as 250 and 300 m targets are in the current qualification.
• Other firing positions: Fire from windows, Modify position when needed, Fire while moving, Fire under stress	• No formal recommendation regarding whether all firing positions should be trained or only some. Training to fire while moving could be difficult given safety policies on Army ranges.
• Semi and auto fire	• Lowest priority in skill set for all selected branches (67%).

Note. Branches were Infantry (High) plus Engineer, Armor, Field Arty, CBRN, Military Police, Mechanical Maintenance (Moderate).

Table 12
Branch Specific Marksmanship Requirements

Branch and Skills	Comments
Infantry (7 skills)	
• Hit targets beyond 300 m	• Consistent with long range marksmanship comments. Marked by 67% of Infantry leaders; less than 50% for all other branches.
• Fire with nondominant hand	
• Hit one specified lethal zone on target	
• Adjust sight picture for firing conditions such as wind	• Recommendation based on Infantry leader comments about ballistics.
• Hit targets with shorter exposure time; Precision firing: Hit 3 targets and hit multiple lethal zones on a target	• Reflects need for a more complex course-of-fire for Infantry. Requires software and/or target changes to current ranges.
Military Police (1 skill)	
• Switch from primary to alternate weapon	• Marked by 90% of Military Police leaders (by about 65% of leaders in High and Moderate Groups, 55% in Low Group).
CBRN (1 skill)	
• Fire with mask	• Marked by 77% of CBRN leaders (by less than 50% of leaders in other branches).

Training on night equipment in units depends on equipment availability and the duty positions to which such equipment is assigned. For example, aiming lights (ALs) are not necessarily assigned to everyone in the branches cited in Table 11. Currently distribution of the thermal weapon sight (TWS) is limited to leaders in Infantry, Cavalry, Combat Engineers, and selected Military Police units.

Table 13
Marksmanship Skills not Perceived as a Requirement for All Branches

Skills (4 skills)	Comments
• Zero in combat gear	• Recommendation to not zero in combat gear based on input from Infantry and Armor leaders.
• Zero at distance initially	• If LOMAH becomes program of record, then this skill could be a requirement (currently used only for confirmation of zero in Basic Training).
• Unaided night fire	• Very low priority for all, probably because of proliferation of NVGs and aiming lights.
• Use of sling	• Low priority by all.

Note. Mean leader percentages for branch groups: High: 46%, Moderate: 53% and Low: 45%.

The findings in Tables 10 through 13 represent the leaders' responses and comments to the questionnaire. And they also reflect recent experience by these leaders in combat environments. It appears that the "one-size-fits-all" does not reflect the beliefs of these combat veteran leaders. Of interest, is that the three branch groups did not follow the traditional "combat arms," "combat service" and "combat service support" functional areas.

Trainer-the-Trainer

No specific question was asked about numbers of or quality of trainers within units, although the increase in the difficulty of the common core of skills for all branches makes this a critical area. Leaders did comment on the quality of marksmanship training and the importance of having good marksmanship trainers in their responses to several of the open-ended questions.

The need for good trainers and special training emerged in the leader answers to the pre-deployment marksmanship training. Leaders indicated that units or individuals often received special marksmanship training via Army courses such as the United States Army Marksmanship Unit (USAMU) training (e.g., squad designated marksmanship course [SDM], BRM), Mountain Leaders Advanced Rifle Marksmanship course at Fort Drum, Eagle Marksmanship course at Fort Campbell, Asymmetric Warfighting Group, Sniper School, and unit SDM courses. Training was also received from private firms or non-Army schools in order to adequately prepare Soldiers. Of interest is that Infantry leaders were most likely to indicate their units/Soldiers had this special training. It appears that some units perceived that they did not have expertise within the unit to adequately prepare Soldiers.

There were positive, yet fewer, comments on unit pre-deployment training which indicated the importance of having good trainers/programs within the unit (primarily by Infantry, Armor and Engineer leaders). Some examples are presented next. A CBRN leader indicated the unit had some very qualified NCOs and Soldiers who knew how to shoot, and they helped others. An Infantry leader cited that Sniper teams helped them achieve excellent zeros. An Infantry leader indicated his Task Force mandated each Infantry platoon send at least one rifleman to train with their Snipers – so each platoon would have at least one designated marksman for long range engagements.

With regard to post-deployment perspectives on the need for trainers and special courses, leaders again cited special courses that would have been beneficial. In addition, leaders commented on the need for NCOs to be good trainers and/or have the time to train. Many of the extended comments also stressed skills that needed to be trained and weapon/marksmanship concepts which Soldiers need to understand. The fact that leaders perceived these areas as not being addressed reflects on perceived training and trainer weaknesses within units.

Ironically, Infantrymen were the most likely to get additional or specialized marksmanship training prior to deployment, even though this branch has the most proficient marksmen. After being deployed, Armor and Engineer leaders also indicated that specialized training would have been beneficial.

The question on the leaders' reaction to the Marksmanship Skill Proficiency Test elicited some of the strongest statements on trainer issues. The primary theme (leaders from eight branches, primarily Armor, Infantry, and Mechanical Maintenance) was that many NCOs do not possess the requisite skills and knowledge, and they are not knowledgeable or proficient with new optics. Leaders stated that hands-on evaluation requires the testers know the skills tested. Sample comments by leaders from five branches are:

Armor*: Test is good idea; problem is that leadership does not know how to conduct tasks themselves.*

Armor*: Army must train NCOs first, obviously, and hold them to the standard.*

CBRN*: Ensure items taught are standardized. NCOs always make up information that is not accurate.*

Mechanical Maintenance*: Many Soldiers do not know the correct way to shoot and their NCOs don't know marksmanship. Therefore Soldiers always shoot bare minimum.*

Mechanical Maintenance*: Train the NCO Corps from top down.*

Military Police*: Leaders should be the first to be evaluated. Most leaders have lost the edge that they had over their Soldiers. You cannot train a Soldier if you do not possess the skill yourself.*

Infantry*: Education pilot program necessary to get senior ranks familiarized with marksmanship terminology, terms, and understandings, e.g. ballistics, pictures identifying malfunctions, or proper sight picture alignment, trajectory are necessary. Video clips of immediate action drills, magazine changes and proper body positions are necessary for uniform standard.*

Infantry*: I think this idea is great, however the most important piece would be the proper blocks of instruction to ensure that Soldiers are actually receiving this type of information from their leaders. I personally believe all of these skills are critical, however I highly doubt that the average Soldier receives the proper levels of instruction that would ensure success on such tests. The instruction and courses are the critical part, in my opinion*

Infantry*: Being able to shoot is easy, being able to teach others how to is the hard part.*

Leaders from branches where marksmanship skills are the most critical voluntarily commented on trainer issues. From these branches, most comments were again from Infantry leaders. These leaders clearly acknowledged the importance of good training, and often indicated there was a need for more qualified NCOs in units, although some units apparently had the required trainer expertise. This profile is consistent with the Infantry's primary role and the need for Infantrymen to be highly proficient with their primary weapon, the rifle.

Three solutions were offered on how to improve the quality of training: USAMU mobile training team, a unit designated marksmanship NCO or master gunner, provide NCOs performance-oriented training in the WLC (Warrior Leader Course), ALC and SLC as was previously done in BNCOC and ANCOC (Basic Noncommissioned Officer Course and Advanced Noncommissioned Officer Course).

Discussion

The marksmanship training received by leaders during the pre-deployment period was impacted by their theater of operation, Iraq or Afghanistan, as well as the general mission of their branch. When leaders from a branch were deployed with maneuver units, their pre-deployment marksmanship training differed from those leaders whose mission was not in direct support of maneuver units. The leaders' comments on training desired but not received provide valuable lessons learned for the future. Not to be minimized is the type and amount of pre-deployment training that leaders felt was needed to enable their Soldiers to be confident of their marksmanship skills as well as to be competent marksmen.

Marksmanship requirements should reflect what is believed to be needed to be prepared for future conflicts. Previous marksmanship manuals show how conflicts have influenced marksmanship training and doctrine (e.g., Departments of the Army and Air Force, 1951 [FM 23-5], McFann, Hammes & Taylor, 1955). The conflicts in Iraq and Afghanistan repeat this trend, in that the combat experiences of the leaders clearly influenced their responses to the questionnaire. The questionnaire findings also indicated that the branches which were most likely to be in a close fight with dismounted forces had the most requirements. It is for decision-makers to determine whether the specific requirements identified by leaders are likely to apply to

future conflicts, and whether they will be integrated in future training and doctrine literature or in training practices. Regardless, the findings are distinguished by the fact that they are based on combat experiences.

Marksmanship Strategy Considerations

Although leaders were asked to identify marksmanship requirements for just the Soldiers in their branch, there were areas of agreement as reflected in the skills identified for a non-live fire Marksmanship Skills Proficiency Test and live-fire. The skills selected for the proficiency test were basic skills that are currently trained, except the scope of two was modified, consistent with leaders' comments on combat experiences regarding these skills. Specifically, demonstration of firing positions was expanded to include other than those in current qualification, and magazine changes was modified to emphasize rapid and tactical changes. The test was hands-on with the exception of a knowledge test to examine marksmanship areas which cannot be easily demonstrated in a hands-on setting.

For live-fire, the common core of skills included more advanced competencies than is currently the case in basic rifle marksmanship training (DA, 2011). These included hitting moving targets; discriminating between friendly forces, enemy forces, and noncombatants; firing from different positions to include barricades, and engaging all targets in the sector of fire. These additional skills directly reflect combat requirements and will require more training resources and expert trainers. Also included in this core were zeroing the weapon with iron sights and unit sights or optics, engaging both single and double targets, reacting to malfunctions, rapidly changing magazines, firing from positions qualification, and engaging targets at 200 m and closer.

It was not deemed reasonable to propose a unique set of marksmanship skills for each branch. Three groups of branches were identified with specific clusters of skills linked to each group. The common set of skills referred to in the previous paragraph was the only cluster of skills linked to the branches with the fewest requirements (Military Intelligence, Signal, Air Defense, Aviation, Transportation, Quartermaster and Ammunition). The other two branch groups had additional skills. The branch group with the moderate number of requirements (Engineer, Armor, Military Police, Field Artillery, CBRN, and Mechanical Maintenance) was also linked to a cluster of skills which required more skill (e.g., firing and qualifying in gear, engaging targets at 250 to 300 m, engaging targets with night optics/devices, and proficiency with even more firing positions). Lastly, the requirements for the Infantry branch included all the skills linked to the other two groups plus a set of more complex skills. The Infantry branch requirements were the most numerous, the most diverse, and the most complex of all the branches. This is consistent with the Infantry's primary combat mission and was reflected in the leader comments on the need for a more complex course-of-fire.

As the questionnaire results showed that some branches should be training on marksmanship skills not currently emphasized, this would imply a change in training strategy to include development of effective and efficient means of training these skills, training schedules that allow for the required training time, and preparing trainers. Also, the Strategies in Training Commission (STRAC) manual (DA, 2014) allocates ammunition for all zeroing and qualification

events including use of night devices and optics (NVGs/ALs and TWS) for unit/duty positions with this equipment. Only the Infantry has an allocation for advanced marksmanship skills. Thus STRAC does not directly support training on some of the advanced skills which leaders specified as critical for their Soldiers.

Recurring Marksmanship Issues and Challenges

Some recurring marksmanship issues were reflected in the leader responses, which bear consideration and attention. These issues were the scope of marksmanship training beyond skills required in qualification, progressive training strategies that address more complex skills, and the need for expert trainers in units.

The scope of the qualification course-of-fire bears re-examination. This is critical, as leaders often said unit training was only to the test, meaning qualification. Although the majority indicated the current qualification course was satisfactory, other comments and responses indicated inconsistencies with this response. High priority skills included hitting moving targets, firing from barricades, and target discrimination. However, proficiency with such skills could be achieved through means other than qualification. The other major issue surrounding qualification was the distance to the targets, with branches in the group specifying the fewest marksmanship requirements indicating they felt shooting beyond 200 m was not needed, whereas the other branches perceived the ability to hit targets beyond 200 m as critical. Lastly, a critical question is whether the core of common skills is the “right” or ”best” set, for all branches and particularly for branches in the Low Requirements group, as the common set was also the “total” set of skills for branches in the Low Requirements group.

Long range marksmanship skills were deemed essential by only the Infantry leaders. However, currently such training is not provided to all Infantry, and is concentrated in those individuals designated to be squad designated marksmen. However, deployment training comments by some Infantry leaders indicated they felt that more Soldiers within a squad should have such skills. Clearly, the deployments to Afghanistan reinforced the need for long range marksmanship skills. Historical records also show that this skill has been examined by the Infantry School at various points in time (Burba, 1987; Cavessa, 1990, Ehrhart, 2009), yet has never been incorporated in Infantry One Station Unit Training (OSUT).

Shooting and qualifying in gear were other skills emphasized by branches in the Moderate Requirements group and the Infantry branch. However, STRAC does not allocate, for example, ammunition for qualifying in gear and qualifying without combat gear.

Moving target skills have been stressed historically as well, as early as the 1950s (McFann et al., 1955) and later (Wilson, 1971), but no Army-wide training procedures and facilities have been developed. Challenges with training such skills exist, among them the lack of moving target ranges, and limited data on effective means to train these skills (e.g., Hunt, Parish, Martere, Osborne, & Evans, 1987; Wilson, 1971). The current marksmanship Field Manual (DA, 2011) shows lead rules for iron sights, but given the emergence and common use of different optics, research is needed on how to use these optics to engage moving targets.

Another major challenge is how to address the more complex skills identified by some leaders. Only the Infantry leaders favored a more complex course of fire for their Soldiers. This was despite a majority of leaders (80%) favoring CFF, the many comments on other advanced skills that needed to be trained, and leaders indicating that some more complex skills were requirements (e.g., hitting moving targets, firing from other positions). Coupled with this is the need for progressive training strategy/exercises to develop these skills. From the perspective of post-deployment, many leaders stated that their Soldiers needed more live-fire, but did not or were not able to specify exactly what type of training that should be. A critical element to improving marksmanship skill is feedback on exactly where the firer is hitting, which can be provided by KD and/or LOMAH ranges. Liwanag (2006) stated that "KD and competition produce precision riflemen" (p. 31). Dubis and Cooley (1994) argued that KD firing is the essential means for development of marksmanship skills, because of the feedback it provides on trajectory, zero, wind and performance. This information is not available with 25 m zeroing and qualification. As such they stated it is not "expendable." (p. 44). LOMAH systems also provide similar feedback. Also LOMAH has been found critical in the training of night fire skills (Dyer et al., 2005). The application of feedback capabilities to ranges for training the more advanced marksmanship skills (e.g., use of combat gear, firing from different positions, hitting at precise locations) would be an essential means to developing skills.

The other major challenge emerging from the leader responses was the need for expert trainers in units. That some units sent Soldiers to special Army or private schools prior to deployment to acquire needed skills is evidence of lack of adequate unit trainer skills. In addition, trainers are challenged by the perishability of marksmanship skills (Cobb, James, Graves & Wampler, 2009a, 2009b) during their initial entry training. The failure of new Soldiers to maintain recently learned, often not mastered, skills must be addressed in the unit. Unit trainers, many of whom may not have extensive experience in marksmanship or as a marksmanship trainer, are faced with training challenges. Leaders often commented on the need to increase the technical skills of the NCOs responsible for training and increase their ability to train others. They praised highly the trainers in the special courses they attended prior to deployment. Achieving the desired level of skill expressed by the leaders surveyed cannot be accomplished without expert trainers, and the mechanism for ensuring trainer expertise bears attention by Army decision-makers.

Conclusions

The findings identified marksmanship skills which are not currently emphasized, but definitely warrant consideration. The findings provide a foundation for creating future marksmanship strategies and will assist in making decisions regarding resource allocations. The following areas were identified as warranting attention by decision-makers:

- How to best address the identified branch differences in marksmanship requirements,
- Whether the qualification course-of-fire should be re-examined or changed,
- Development of a progressive unit training strategy to ensure both core and advanced marksmanship skills are trained and sustained,
- Addressing recurring issues such as training Soldiers to hit moving targets, not just Infantry but other branches, and the distance at which targets should be engaged, and

- Determining the best means of ensuring expert trainers in units with the required technical expertise and the ability to train others.

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Appendix A

Deployment Training Summary

Table A1
Comments on Pre-Deployment Training and Additional Training Needed

Marksmanship Training Categories	Pre-Deployment Training # Comments (% of Total)	Pre-Deployment Training # Branches	Additional Training Needed # Comments (% of Total)	Additional Training Needed # Branches
BRM-Related Skills	530 (39%)		87 (11%)	
BRM (with no details)	109	14	23	11
Qualification	115	14	13 (w zero)	6
Zeroing	30	11	…	…
Live-Fire (excluding qualification & zeroing	205	15	21	4
PMI	31	11	11	4
EST/Simulation	40	13	19	9
ARM-Related Skills	603 (44%)		310 (44%)	
ARM	94	15	64	12
LRM	54	8	68	10
Stress Shoots	59	11	31	10
Optics/Sights/Lasers	25	9	19	11
Night Fire	15	8	15	6
SRM/CQM/CQB	192	15	60	12
Reflexive Fire	155	16	53	14
Other ARM	9	3	…	…
Targetry	…	…	20	8
Training on Other Weapons	135 (10%)		111 (14%)	
Crew-Served Weapons	68	10	59	12
Pistol	23	12	8	5
Gunnery – Vehicle or Aerial	36	9	5	4
Weapons (general)	8	5	27	11
Weapons Used When Deployed	…	…	12	6
Special Course	97 (7%)		77 (10%)	
SDM	26	8	25	8
AWG	11	4	7	2
Sniper School/Training	6	3	12	5
Other Courses	48	11	22	9
Unit Designated Course	3	1	6	5
Private/Personal	3	3	…	…
NCO Training/Preparation	…	…	5	3
More Live-Fire Training: Not defined as BRM or ARM	…	…	195 (25%)	10
Total # of Comments	1365		780	

The abbreviations in Table A1 are defined as: PMI (preliminary marksmanship instruction); LRM (long range marksmanship), SRM (short range marksmanship); CQM (close

quarters marksmanship), CQB (close quarters battle), SDM (squad designated marksman), AWG (Advanced Warfighting Group).

Appendix B

Leader Percentages by Branch on a Marksmanship Skills Proficiency Test and on Marksmanship Skills

- Table B1 summarizes the responses of all leaders on the proficiency test items and marksmanship requirements.
- Table B2 presents the results for each of the Maneuver Fire and Effects branches.
- Table B3 presents the results for the Force Sustainment and Operations Support branches.
- Table B4 orders the branches from high to low in terms of marksmanship requirements.

The first three tables in Appendix B present data on the Skill Proficiency Test question and the series of marksmanship requirements questions. The Skill Proficiency Test data also include the percentages of leaders who thought a knowledge test should be included and who favored a proficiency test. For each set of marksmanship requirements the leaders could have marked "none of the above" indicating that none of the skills in the set was required for their Soldiers. These percentages are included in the tables. In addition, the marksmanship requirements section includes the percentages of leaders who thought a course of fire such as Combat Field Fire (CFF) was required for their Soldiers and whether a range system that provides feedback on the location of rounds relative to each target would be beneficial (e.g., LOMAH – location of miss and hit) was needed. The fourth table presents additional information on marksmanship requirements.

The skills are fully labeled in Table B1. Table B1 can be used as a reference, when needed, to interpret abbreviations in Tables B2 and B3.

Table B1

Weighted Percentage of Leaders From all Branches Marking Skills for a Marksmanship Skills Proficiency Test and as Marksmanship Requirements for Soldiers in Their Branch

Skill Set	Weighted %
Proficiency Test, Skills in Set A	
Assemble/Disassemble Rifle	80.8
Perform a Function Check	85.7
Load Magazine	68.1
Change Magazine	73.8
Perform Immediate Action	87.3
Correct a Malfunction	87.1
Clear Weapon	84.1
Demonstrate Correct Firing Position	71.4
Mean	79.8
Proficiency Test, Skills in Set B	
Mount Optic	50.9
Boresight Optic	59.0
Mount Aiming Light (AL)	44.9
Boresight Aiming Light (AL)	48.9
Demonstrate Proper Use of Sling	52.7
Determine Dominant Eye	57.4
Determine Sight Adjustment from Diagram	72.5
Mean	55.1
Include Knowledge Test	71.0
Favor Proficiency Test	79.1
Skill Requirements (by skill sets, S1 through S7)	
S1 - Zeroing	
Zero Sight Organic to Unit	80.7
Zero in Gear	56.6
Zero Backup Iron Sight (BIS)	76.8
Zero at 25m	81.5
Confirm Zero at Distance	71.5
Zero at Distance Initially	35.7
Mean	65.1
S2 - Firing Position	
Prone Supported	75.7
Prone Unsupported	75.7
Kneeling	76.2
Standing	75.4
Around or Behind Obstacles	77.4
From Windows/Enclosures	65.7
While moving	78.2
Under stress	76.4

Skill Set	Weighted %
Modify Position to take Advantage of Obstacles	70.2
Mean	73.1
S3 - Distance for Hitting Targets	
Under25m	73.3
From 25-100m	86.3
From 100-200	83.9
From 200-300	71.8
Beyond 300m	46.4
Mean	70.1
S4 – Target Acquisition	
Acquire Targets in Sector of Fire	81.1
Discriminate between Friendly/Enemy/ Noncombatants	80.6
Hit Single Target	66.6
Hit Two Targets	68.5
Hit Three Targets	52.7
Hit Targets w/ Shorter Exposure Time	52.7
Mean	65.2
S5 - Precision firing	
Adjust Sight Picture for Conditions such as Wind	55.7
Hit in Single Lethal Zone	61.4
Hit in Multi-lethal Zones	52.0
Hit Moving Targets	84.9
Hit Targets at Elevations Different from Firer	71.5
Mean	63.5
S6 - Equipment	
Fire in Gear	69.1
Qualify in Gear	70.9
Hit Targets with Aiming Light and Night Vision Goggles	70.6
Hit Targets with Thermal Weapon Sight (TWS)	56.6
Fire with Protective Mask	36.6
Fire with Sling	53.3
Mean	55.7
S7 - Other Skills	
Switch between Primary and Secondary Weapons	63.1
Quickly Change Magazine	76.6
React to Malfunctions in Exercises	75.3
Hit Targets with Unaided Night Vision	48.5
Short Range Marksmanship Skills	75.4
Skill with Different Firing Modes	62.4
Shoot with Nondominant Hand when Needed	59.4
Mean	64.2
Favor Combat Field Fire (CFF)	80.5
Favor Location of Miss & Hit (LOMAH)	82.3

Table B2

Percentage of Leaders Marking Skills for a Marksmanship Skills Proficiency Test and as Marksmanship Requirements for Soldiers in Their Branch: Maneuver Fires and Effects Branches

	Branch Percentage							
Skill Set	Infantry (*n*=246)	Armor (*n*=170)	Military Police (*n*=135)	Engineer (n=122)	Field Artillery (*n*=143)	CBRN (*n*=71)	Aviation (*n*=62)	Air Defense (*n*=27)
Proficiency Test Set A								
Assemble/Disassemble	85	85	83	**94**	85	84	77	67
Function Check	87	88	88	**97**	86	**90**	85	81
Load Magazine	77	69	68	80	72	86	63	48
Change Magazine	86	73	81	84	75	86	74	56
Immediate Action	**95**	**92**	87	**96**	87	**90**	**90**	74
Malfunction	**96**	**90**	**90**	**93**	**90**	**91**	89	81
Clear Weapon	87	87	84	**96**	85	**90**	84	74
Firing Position	71	70	69	80	77	84	73	63
None	4	3	4	2	3	3	3	7
Mean	85.50	81.75	81.25	90.00	82.13	87.63	79.38	68.00
Proficiency Test Set B								
Mount Optic	50	49	63	63	53	65	52	30
Boresight Optic	72	75	65	68	68	66	42	37
Mount AimLight	48	49	53	54	43	55	35	30
Boresight AimLight	61	65	52	58	47	61	39	33
Sling	45	42	53	61	59	69	56	48
Dominant Eye	50	48	61	65	59	66	69	70
Sight Adjustment	78	70	77	85	75	82	74	59
None	10	9	7	7	8	11	8	15
Mean	57.71	56.86	60.57	64.86	57.71	66.29	52.43	43.86
Include Knowl Test	76	66	70	74	69	70	71	67
Favor Proficiency Test	86	82	85	89	82	80	82	59
Skill Requirements (Skill Sets S1 through S7)								
S1 - Zeroing								
Zero Organic Sight	**91**	88	83	88	79	83	79	59
Zero in Gear	45	45	60	65	62	73	52	56
Zero BIS	83	83	83	86	78	82	81	56
Zero at 25m	86	78	79	87	82	84	89	78
Confirm Zero at Dist	85	75	72	80	75	75	63	44
Zero at Distance	37	34	38	43	38	55	31	26
None Zero	2	2	4	2	3	3	5	15

	Branch Percentage							
Skill Set	Infantry (*n*=246)	Armor (*n*=170)	Military Police (*n*=135)	Field Engineer (n=122)	Field Artillery (*n*=143)	CBRN (*n*=71)	Aviation (*n*=62)	Air Defense (*n*=27)
Mean	71.17	67.17	59.86	74.83	69.00	75.33	65.83	53.17
S2 - Firing Position								
Prone Supported	85	75	70	79	78	79	76	81
Prone Unsupported	85	71	73	81	75	79	74	70
Kneeling	87	82	77	84	74	84	69	70
Standing	84	76	76	84	75	82	71	59
Obstacles	**92**	81	87	81	80	76	77	67
Windows	82	76	74	70	68	75	69	59
While Moving	85	81	84	85	82	82	69	56
Under Stress	**93**	82	87	85	83	86	76	52
Modify Position	83	77	76	81	69	72	73	59
None- Firing Position	2	3	3	3	1	3	5	7
Mean	86.22	77.89	70.70	81.11	76.00	79.44	72.67	63.67
S3 – Distance for Hitting Targets								
Under 25m	82	72	81	85	71	86	79	56
From 25-100m	89	83	89	**95**	82	**91**	89	85
From 100-200m	**90**	84	82	**93**	87	89	87	78
From 200-300m	**90**	73	62	77	78	76	65	63
Beyond 300m	67	47	38	48	47	44	35	18
None- Distance	1	3	1	2	2	4	5	7
Mean	83.60	71.80	70.40	79.60	73.00	77.20	71.00	60.00
S4 - Target Acquisition								
Sector of fire	87	81	81	**92**	81	80	76	63
Discriminate	**93**	86	87	88	85	80	82	74
Single Target	77	69	64	70	66	79	64	70
Two Targets	82	73	70	75	71	75	66	59
Three Targets	67	54	50	54	59	58	43	44
Shorter time	66	46	59	54	55	58	47	33
None- Tgt Acquisition	2	2	2	2	3	7	5	11
Mean	78.67	68.17	59.00	72.17	69.50	71.67	63.00	57.17
S5 - Precision Firing								
Adjust Sight	64	54	51	52	62	61	50	63
Single Lethal Zone	75	56	67	66	59	66	47	41
Multi-lethal Zone	66	50	57	56	53	55	37	33
Moving Targets	**95**	89	89	87	**90**	83	89	70
Elevation	88	78	73	80	77	82	69	59
None -Precision Fire	2	5	4	7	3	6	8	15
Mean	77.60	65.40	56.83	68.20	68.20	69.40	58.40	53.20

	Branch Percentage							
Skill Set	Infantry (*n*=246)	Armor (*n*=170)	Military Police (*n*=135)	Field Engineer (n=122)	Field Artillery (*n*=143)	CBRN (*n*=71)	Aviation (*n*=62)	Air Defense (*n*=27)
S6 - Equipment								
Fire in Gear	83	71	75	77	74	77	60	70
Qualify in Gear	80	68	74	76	75	72	60	56
AL-NVG	**93**	78	74	77	72	76	63	48
TWS	73	72	61	70	57	65	45	41
Mask	34	29	33	31	37	77	27	44
Sling	52	48	53	57	59	58	61	48
None- Equipment	2	5	7	3	5	3	6	22
Mean	69.17	61.00	53.86	64.67	62.33	70.83	52.67	51.17
S7 - Other Skills								
Switch Weapon	68	71	**90**	74	61	66	68	41
Change Magazine	**95**	87	86	**93**	85	82	79	52
React to Malfunction	88	76	82	**91**	78	83	77	59
Unaided Night Fire	49	45	58	49	54	62	45	44
Short Range	88	80	84	84	77	82	71	48
Different Fire Modes	65	64	61	69	70	69	63	41
Nondominant Hand	73	57	66	69	59	66	53	52
None - Other Skills	1	4	1	3	4	4	10	26
Mean	75.14	68.57	66.00	75.57	69.14	72.86	65.14	48.14
Favor CFF	**96**	86	87	88	87	77	71	48
Favor LOMAH	85	83	81	85	80	84	85	59

Note. Any percentages greater than or equal to 90% are in bold font.

Table B3

Percentage of Leaders Marking Skills for a Marksmanship Skills Proficiency Test and as Marksmanship Requirements for Soldiers in Their Branch: Force Sustainment and Operations Support Branches

	Branch Percentage				
	Force Sustainment				
	Transportation	Ammunition	Mechanical Maintenance	Quarter-master	Operations Support
Skill Set	(*n*=130)	(*n*= 73)	(*n* = 258)	(*n*=144)	(*n*=22)
Proficiency Test Set A					
Assemble/Disassemble	75	75	82	74	77
Function Check	80	79	85	85	82
Load Magazine	64	73	64	66	59
Change Magazine	65	78	67	65	68
Immediate Action	79	89	84	78	86
Malfunction	81	82	87	83	77
Clear Weapon	77	86	86	77	82
Firing Position	72	66	77	71	64
None	7	5	4	6	14
Mean	74.13	78.50	79.00	73.33	74.38
Proficiency Test Set B					
Mount Optic	49	60	55	58	36
Boresight Optic	47	55	54	53	50
Mount AimLight	40	48	43	53	36
Boresight AimLight	45	45	45	52	32
Sling	51	51	56	60	50
Dominant Eye	55	56	58	56	59
Sight Adjustment	65	67	78	67	64
None	15	16	9	15	18
Mean	50.29	54.57	55.57	57.00	46.71
Include Knowl Test	67	63	77	81	59
Favor Proficiency Test	76	71	82	87	59
Skill Requirements (Skill Sets –S1 through S7					
S1 - Zeroing					
Zero Organic Sight	65	77	77	71	82
Zero in Gear	55	60	67	60	59
Zero BIS	61	71	75	60	82
Zero at 25m	71	81	82	69	86
Confirm Zero at Dist	61	70	74	65	64
Zero at Distance	40	36	39	42	23
None Zero	11	7	6	6	0
Mean	58.83	65.83	69.00	61.17	56.57
S2 - Firing Position					

	Branch Percentage				
	Force Sustainment				
	Transportation	Ammunition	Mechanical Maintenance	Quarter-master	Operations Support
Skill Set	(*n*=130)	(*n*= 73)	(*n* = 258)	(*n*=144)	(*n*=22)
Prone Supported	72	67	80	74	64
Prone Unsupported	68	67	77	71	73
Kneeling	65	73	76	74	68
Standing	70	66	74	70	73
Obstacles	61	78	76	69	68
Windows	61	66	71	58	41
While moving	68	75	78	74	77
Under stress	63	74	76	69	59
Modify Position	57	73	72	60	59
None -Fire Position	8	5	3	6	0
Mean	65.00	71.00	75.56	68.78	58.20
S3 – Distance for Hitting Targets					
Under25m	60	77	77	66	64
From 25-100m	78	81	**91**	85	82
From 100-200m	70	89	89	78	77
From 200-300m	66	66	72	66	59
Beyond 300m	35	37	39	43	45
None - Distance	5	3	2	4	4
Mean	61.80	70.00	73.60	67.60	55.17
S4 - Target Acquisition					
Sector of fire	68	77	80	74	86
Discriminate	67	73	75	67	77
Single Target	58	62	67	62	59
Two Targets	60	64	68	60	59
Three Targets	48	52	55	49	41
Shorter time	43	51	49	48	50
None - Tgt Acquisition	10	8	4	8	4
Mean	57.33	63.17	65.67	60.00	53.71
S5 - Precision Firing					
Adjust Sight	59	53	56	58	45
Single Lethal Zone	52	55	65	63	54
Multi-lethal Zone	48	47	57	51	41
Moving Targets	75	77	86	78	77
Elevation	61	66	74	64	54
None - Precision Fire	11	15	6	10	14
Mean	59.00	59.60	67.60	62.80	47.50
S6 – Equipment					
Fire in Gear	56	66	69	67	54

	Branch Percentage				
	Force Sustainment				
	Transportation	Ammunition	Mechanical Maintenance	Quarter-master	Operations Support
Skill Set	(*n*=130)	(*n*= 73)	(*n* = 258)	(*n*=144)	(*n*=22)
Qualify in Gear	65	71	73	71	64
AL-NVG	60	63	67	59	59
TWS	51	45	59	58	32
Mask	38	36	39	49	32
Sling	46	49	60	58	45
None Equipment	14	14	7	10	18
Mean	52.67	55.00	61.17	60.33	43.43
S7 - Other Skills					
Switch Weapon	53	59	64	60	50
Change Magazine	63	74	79	69	50
React to Malfunction	61	70	71	65	68
Unaided Night Fire	48	60	51	49	41
Short Range	57	71	76	63	73
Different Fire Modes	55	57	67	58	59
Nondominant Hand	53	68	59	51	50
None - Other Skills	11	11	5	10	14
Mean	55.71	65.57	66.71	59.29	50.63
Favor CFF	67	73	82	83	64
Favor LOMAH	74	88	84	83	82

Note. Any percentages greater than or equal to 90% are in bold font.

Table B4
Average Skill Set Percentage for Leader Branches: Marksmanship Requirements (Ordered From Highest to Lowest)

Branch	Functional Category	Average Skill Set Percentage
Infantry	MFE	77.4%
CBRN (Chemical Biological, Radiological, Nuclear)	MFE	73.8%
Engineer	MFE	73.7%
Field Artillery	MFE	69.6%
Armor	MFE	68.6%
Mechanical Maintenance	FS	66.9%
Aviation	MFE	64.1%
Ammunition	FS	63.1%
Transportation	FS	61.5%
Military Police	MFE	60.7%
Transportation	MS	56.8%
Air Defense Artillery	MFE	55.2%
Operations Support (Signal and Military Intelligence)	OS	52.2%

Appendix C

Acronyms

AIT	Advanced individual training
AKO	Army Knowledge Online
AL	Aiming light
ALC	Advanced Leader Course
ANCOC	Advanced Noncommissioned Officer Course
ARM	Advanced rifle marksmanship
AWG	Asymmetric Warfighting Group
BNCOC	Basic Noncommissioned Officer Course
BRM	Basic rifle marksmanship
BT	Basic training
CBRN	Chemical, Biological, Radiological and Nuclear
CCC	Captains Career Course
CFF	Combat Field Fire
CMF	Career Management Field
CQB	Close quarters battle
CQM	Close quarters marksmanship
DA	Department of the Army
DOTD	Directorate of Training and Doctrine
EST	Engagement Skills Trainer
FORSCOM	Forces Command
FM	Field Manual
FS	Force Sustainment
KD	Known distance
LOMAH	Location of Miss and Hit
LRM	Long range marksmanship
MCoE	Maneuver Center of Excellence
MFE	Maneuver Fires and Effects
MOS	Military occupational specialty
NCO	Non-commissioned officer
NVG	Night vision goggle
OS	Operations Support
OSUT	One Station Unit Training
PMI	Preliminary Marksmanship Instruction

SDM	Squad designated marksman
SLC	Senior Leader Course
SRM	Short range marksmanship
STRAC	Strategies in Training Commission
TWS	Thermal weapon sight
USAMU	United States Army Marksmanship Unit
WLC	Warrior Leader Course