

READING ABILITY AND OTHER CORRELATES
OF THE SQT WRITTEN COMPONENT

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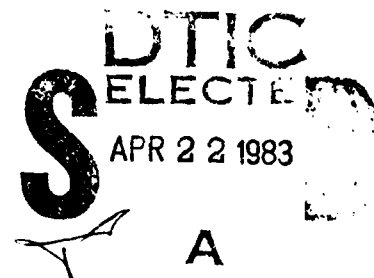


U. S. Army

Research Institute for the Behavioral and Social Sciences

April 1982

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Research Note 82-31	2. GOVT ACCESSION NO. AD-A12751	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) READING ABILITY AND OTHER CORRELATES OF THE SQT WRITTEN COMPONENT		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER FR-MTRD(TX)-80-1
7. AUTHOR(s) Elmo E. Miller, Charles O. Nystrom, and John A. Hicks, III		8. CONTRACT OR GRANT NUMBER(s) MDA903-79-C-0191
9. PERFORMING ORGANIZATION NAME AND ADDRESS Human Resources Research Organization 300 North Washington Street Alexandria, Virginia		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 2Q263739A793
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Research Institute for the Behavioral & Social Sciences, 5001 Eisenhower Avenue Alexandria, Virginia 22333		12. REPORT DATE April 1982
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) ARI Field Unit-Fort Hood HQ TCATA, PERI-SH Fort Hood, Texas 76544		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Training Infantry Classification Skills Armor Graphic Arts Manuals Personnel Personnel development Jobs Requirements Psychological tests Mortars Job training Test construction (psychology)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) In this report SQT scores are correlated with reading ability, demographic variables, and questionnaire responses. Reading ability, as measured by a standard test, is substantially correlated ($r=.46$) with scores on the Written Component (WC), but much of the relationship may be explained in terms of general ability, since reading ability also correlates with the Hands-On Component (HOC) ($r=.25$). Soldiers who say they can understand the Soldier's Manual and the WC questions score higher on the WC. WC scores were not related appreciably: (1) to perceived quality of training, (2) to career satisfaction, (3) to time in service, (4) to		

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Unclassified

1 SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Block 20 - Abstract

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5001 Eisenhower Avenue, Alexandria, Virginia 22333

Office, Deputy Chief of Staff for Personnel
Department of the Army

April 1982

Army Project Number
2Q263739A793

Operational Testing
and Evaluation

Approved for public release; distribution unlimited.

READING ABILITY AND OTHER CORRELATES OF THE SQT WRITTEN COMPONENT

BRIEF

Requirement:

The work described in this report received its original impetus from the common complaint that the Written Component (WC) of the Skill Qualification Testing (SQT) depends too much upon reading ability, despite its practical orientation. The requirement statement for this effort specifies research to determine "the relationship between reading skill level and SQT performance" and other factors related to success on the SQT. The objectives which guided this research were:

- To determine the correlation between reading ability, as measured by a standard test, and success on the WC of selected SQTs.
- To determine the correlation between the WC scores and demographic variables (age, education, time in service).
- To determine the correlation between the WC scores and questionnaire responses pertaining to the training they received, difficulty in understanding the Soldier's Manual and questions on the WC, and satisfaction with their Army career.

Procedure:

A computerized data base was established, including SQT scores, reading test scores, demographic variables, and questionnaire responses. Correlational techniques, including factor analysis and stepwise regression, were used to determine significant correlates of SQT performance.

Findings:

- Reading ability correlates substantially with WC scores.
- The overall $r = .46$, with particular MOS and levels varying around that figure. But much of that correlation may be explained by general ability, since reading ability also correlates significantly with the Hands-On Component (HOC) (overall $r = .25$).
- Soldiers who scored low on the WC also tended to report difficulty in understanding their Soldier's Manuals and the WC questions.
- Soldiers who got their Soldier's Manuals earlier tended to score higher on the WC.
- Differences in perceived quality of training were not appreciably correlated with WC scores in the sample studied.
- SQT scores were not significantly related to career satisfaction.
- SQT scores were not significantly related to age, civilian education, or time in service.

Utilization of Findings:

The Army may continue to use the multiple-choice form of SQT for assessment of job skills without fear that the scores reflect mostly reading ability, rather than job performance. However, those who write the tests should try to simplify the wording of questions, because the scores do reflect reading ability to some degree.

CONTENTS

CHAPTER	PAGE
1 INTRODUCTION AND BACKGROUND	1
Introduction	1
Background	2
2 DESIGN AND PROCEDURES	3
3 RESULTS AND ANALYSES	6
Test Scores	6
Demographic Variables	6
Demographic Variables and Test Scores	8
Questionnaire Items	8
Questionnaire Items and Demographic Variables	8
Questionnaire Responses vs. Test Scores	11
Stepwise Regression	11
A Model Relating the Significant Variables	12
Item Analysis	14
4 SUMMARY AND CONCLUSIONS	15
Correlations Among Tests	15
Demographic Data	15
Questionnaire and SQT Scores	15
Item Analysis	16
Conclusion	19
REFERENCES	17
APPENDIX Survey Form	19
TABLES	
Table 2-1 Definition of Variables	4
Table 3-1 Correlation Matrix	7
Table 3-2 Correlation Matrix Used For Factor Analysis of Questionnaire Responses	9
Table 3-3 Sorted Rotated Factor Loadings (Pattern)	10
Table 3-4 Stepwise Regression	13

Chapter 1

INTRODUCTION AND BACKGROUND

Introduction

Skill Qualification Testing (SQT) was first used in the Army in a preliminary form in 1976. Testing large numbers of troops for record in several Military Occupational Specialties (MOS) began in the 1977 test period. In FY 1979, a total of 456 SQT tests were developed and administered for various MOS and levels.

SQT is widely acknowledged as a significant advance over the previous "knowledge based" MOS tests. As a "criterion-referenced" system, it is concerned with measuring the skills actually used on the job, applying the standards needed for successful performance. SQT tests consist of three parts: (1) a Written Component (WC) which involves printed questions and multiple choice, machine scored answers, (2) a Hands-On Component (HOC) which involves performance with the actual job equipment, and (3) a Performance Certification Component (PCC) which involves performance in an environment that cannot be readily duplicated in a test situation (e.g., rifle marksmanship).

However, there have been widespread complaints by both commanders and troops that the WC still depends too much upon reading ability, despite the practical orientation of the tests. Some of the questions still have a "bookish" or "contrived" quality that is characteristic of multiple choice exams. One consequence of the criticism has been to reduce the length of the WC and its relative importance in the scoring. It would seem desirable to have objective evidence whether such action is warranted, or, whether even more severe restrictions on WC items should be imposed.

On the other hand, WC has some unique advantages, especially efficiency and ease of scoring. Also, some soldier tasks can be simulated very well with the WC format (e.g., map reading). Therefore, it is desirable to find out the advantages and disadvantages of WC, when it can be used effectively, and how to do it.

The present report is an attempt to assess the importance of reading skill and various other factors on WC scores. It is hoped the data and analysis may aid in decisions concerning the use of SQT.

Background

Hicks¹ administered a questionnaire to determine soldiers' opinions about training they received for SQT and about the SQT itself. (That study was an antecedent of the present study, which uses the same questionnaire for some variables.) Hicks reported that about "two thirds of the soldiers expressed satisfaction with the Skill Qualification

¹J. A. Hicks, III. Skill qualification test (SQT) opinion survey: 11B's, 11C's, and 11E's (Research Memorandum 78-8). Alexandria, Virginia: US Army Research Institute for the Behavioral and Social Sciences, March 1978.

Testing System." Of particular relevance here is the fact that most soldiers received their Soldier's Manuals (SM) less than six months before testing, contrary to the goal according to the SQT handbook. However, almost all soldiers in the sample (90%) reported receiving their SM two months or more before testing. Almost half (43%) of the soldiers who read their SM reported some difficulty in understanding them. Also, almost half (46%) of the soldiers reported some difficulty in understanding questions on the WC of the SQT.

Another questionnaire survey by Yates² assessed the impact of SQT in USAREUR for infantry units. Her results pinpointed some administrative and training problems including: getting the Soldier's Manuals distributed on time (six months before testing), criticism of the preparation of some training NCOs, shortages of materials and equipment, other activities interfering with training, and nontesting of some eligible personnel.

²L. G. Yates. The estimated impact of SQT on USAREUR infantry units: Survey results (Research Problem Review 79-9). Alexandria, Virginia: US Army Research Institute for the Behavioral and Social Sciences, June 1979.

Chapter 2

DESIGN AND PROCEDURES

The analyses in this report involve a computerized data base drawn from various sources, related on the basis of individuals who were identified by the last four digits of their social security numbers. The SQT test data were obtained from the Individual Training and Evaluation Directorate (ITED) at Fort Eustis, Virginia. Fort Hood's Education Center had scores on a standard reading test, the Metropolitan Achievement Test.¹ SIDPERS (Standard Installation/Division Personnel System) at Fort Hood supplied demographic data, including civilian education (in numbers of years), months in service, and age. A questionnaire about the SQT and preparation for it was administered by ARI to soldiers. Not all cases in the data base included information from all three sources, so the N available varies with the type of analysis.

This report analyzes information from the data base on 25 variables of interest, as defined in Table 2-1. The general analysis is a correlation matrix relating all variables, based upon available cases that had scores on all variables. Since the data cover different MOS and levels, all SQT scores were converted to percent correct, to compensate for different lengths of the various tests.²

Of primary interest are the intercorrelations among test scores. From these data, one may infer the importance of reading skill, as defined by the Metropolitan Achievement Test, for scores on the Written Component (WC). One may also estimate, very crudely, how much of the correlation may be explained by "general ability," since the test data include scores on the Hands-On Component (HOC), which requires no reading.

The demographic variables, in conjunction with test scores, indicate the influence of formal education, time in service, and age upon reading skill and SQT scores. These data indicate whether career soldiers are much like recruits in the tested skills and education, or distinctly different.

The questionnaires encompass so many variables that patterns are difficult to discern, and objectivity of apparent trends is suspect. Factor analysis was used to indicate which items involved related issues, and which items were independent of each other.

¹W. N. Durost, H. H. Bixler, J. W. Wrightstone, G. A. Prescott, & L. H. Balow. Metropolitan achievement tests, Form G. Harcourt, Brace, Jovanovich, 1971.

²It is recognized that the conversion to percentages does not fully neutralize differences in the various tests involved. Therefore, the correlations tend to underestimate somewhat the correlations that would be obtained by considering each test separately.

TABLE 2-1. Definition of Variables

Questionnaire items (see appendix for exact wording)

<u>Symbol</u>	<u>Content</u>	<u>No. of Distinct Values</u>	<u>Polarity^a</u>	<u>Def of Scale</u>
Q3	Validity of SQT	2	-	Yes-No
Q4	Fairness of admin of SQT	2	-	Yes-No
Q5	When SN received	8	+	From 0-6+ months
Q6	When SM received	8	+	(as above)
Q7	When SQT tng started	8	+	(as above)
Q8	Difficulty understanding SM	5	-	Extreme-0, & didn't read SM
Q9	Difficulty understanding WC questions	5	-	(as above)
Q10	Independent study f/SQT	4	-	Extreme-0
Q11	Satisfied w/HOC tng	6	-	Ext sat-ext dissat
Q12	Satisfied w/WC tng	6	-	(as above)
Q13	Supervisor qual f/SQT tng	6	-	Ext qual-ext disqual
Q14	Like SQT tng	6	-	Liked ext-disl ext
Q15	Like MOS	6	-	(as above)
Q16	Career satisfaction	6	-	Ext sat-ext dissat
Q17	SQT important f/career	6	-	Ext imp-ext unimp
Q18	(see appendix, note)			
Q19	How you did on SQT	3	+	<60% to >80%
Demographic variables				
CIVED	Civilian education	18	+	in years, 0-17
SERMO	Months in service	136	+	
AGE	Age in years	25	+	
Test Scores				
WPCT	SC, % scoring units go		+	0-100%
HPCT	HOC, % scoring units go		+	0-100%
TOTPCT	WC+HOC, % scoring units go		+	0-100%
WRDKNOW	Test 1, Met Ach Test		+	Grade lvl, 0-9.9 max
RDCOMP	Test 2, Met Ach Test		+	(as above)
RDLEVL	Test 1+2, Met Ach Test		+	(as above)

^a"Polarity" refers to whether the answer choices are sequenced in an increasing (+) or decreasing scale (-), which will determine whether correlations will be positive or negative.

The correlations of questionnaire responses with test data may indicate relative importance of various training and motivational factors for SQT scores. These data may also indicate whether attitudes about SQT are related to performance on the tests, or independent. A stepwise regression analysis was used to assess the relative importance of questionnaire variables for WC scores. The stepwise regression analysis was also run on data for each MOS separately to see whether the same pattern of results was present in all MOS.

An item analysis was conducted to see how each question on the WC was related to reading level and total score. One index of interest is reversals (when people who miss the item score higher on the reading test or WC total score). Reversals, or even weak discriminators, are less useful as items. Bad items might also be indicated by most people missing the question. The most discriminating items are also of interest.

Chapter 3

RESULTS AND ANALYSES

A correlation matrix for all 25 variables is presented in Table 3-1. The matrix is sectioned according to the three kinds of variables involved (test scores, demographic data, and responses to questionnaire items). A correlation must be at least $\pm .12$ to be statistically significant¹ with $N = 255$ ($p < .5$, two-tail test) and anything less will be considered as having negligible practical significance also. Therefore, $r = \pm .12$ will be the minimum criterion in the discussion that follows.

Test Scores

Correlations among test scores are presented in the right hand section (tail) of the matrix. The most important correlations are between Written Percent Correct (WPCT) and reading test scores (.44, .40, and .46, for word knowledge, reading comprehension and reading level, respectively). This indicates a substantial relationship between reading ability and WPCT.

However, part of these correlations may be explained by a "g" factor ("general ability" or "general intelligence") that relates to both written and hands-on tests, rather than a special reading factor. Hands-on Percent Correct (HPCT) also correlates somewhat with the reading scores (.24, .24, and .25), and the hands-on tests involve no reading. Also, the lower correlations with HPCT may be attributable partly to lower reliability of HPCT, because of shorter tests and much higher average scores. The mean HPCT was 91 (vs. 61 for WPCT), indicating little room for improvement on the hands-on test.

The correlation between WPCT and HPCT is .23, which is modest considering that they are both parts of the SQT. A somewhat larger correlation ($r = .30$) was obtained in a more inclusive sample ($N = 424$ when we include soldiers who did not take the questionnaire), but the correlation is still considered modest. (No other correlation for the larger sample differed appreciably from those presented in Table 3-1.) HPCT correlated about as much with the reading tests as with WPCT, indicating some sort of "g" factor underlying all three tests.

Demographic Variables

The highest correlation among these variables, years of civilian education (CIVED), months in service (SERMO), and age in years (AGE) indicates that people who have been in the Army longer also tend to be older ($r = .77$) which is hardly surprising. There is also some tendency for more formal education among older ($r = .22$) and more senior ($r = .18$) soldiers. These correlations with education may reflect education while in service, or a tendency to eliminate those with less education from the Army, or a combination of the two.

¹W. H. Beyer (ed.). Handbook of tables for probability and statistics, 2nd edition. Cleveland, Ohio: Chemical Rubber Company, 1966, pp 392-393.

TABLE 3-1. Correlation Matrix^a (N = 255)^b

	<u>Q3</u>	<u>Q4</u>	<u>Q5</u>	<u>Q6</u>	<u>Q7</u>	<u>Q8</u>	<u>Q9</u>	<u>Q10</u>	<u>Q11</u>	<u>Q12</u>	<u>Q13</u>	<u>Q14</u>	<u>Q15</u>	<u>Q16</u>	<u>Q17</u>	<u>Q18</u>	<u>Q19</u>
Q4	22																
Q5	-15	-14															
Q6	-10	-21	53														
Q7	-08	-11	41	40													
Q8	-02	-04	07	08	-03												
Q9	-19	-20	11	13	17	33											
Q10	03	-05	-07	-09	-10	30	15										
Q11	08	07	-11	-08	02	10	09	21									
Q12	16	18	-07	-07	-13	06	-12	19	31								
Q13	04	07	-02	-07	-08	07	-02	06	09	24							
Q14	20	06	-04	-04	09	07	03	22	30	20	19						
Q15	09	11	02	-03	-12	00	03	20	08	17	09	29					
Q16	10	09	03	03	-00	17	05	28	17	14	09	37	57				
Q17	16	12	-06	-19	-11	-04	01	29	10	10	18	34	35	45			
Q18	-03	-01	-04	02	-07	08	-08	-02	-02	07	-02	03	01	11	03		
Q19	-16	-13	04	19	00	13	17	-12	-05	-16	02	-07	-17	-04	-28	-02	
CIVED	-02	-01	10	13	03	-03	-03	-07	-10	-00	-01	-05	-02	-01	-07	-01	-01
SERMO	-04	-04	09	08	25	-04	-05	-21	00	-13	00	-02	-01	-08	-16	-10	-00
AGE	01	-00	04	00	15	-02	-11	-14	-02	-12	01	-03	02	-02	-10	-11	-06
WPCT	-09	-15	08	26	11	17	24	07	-06	-14	04	08	-02	13	-11	-00	40
HPCT	-11	-17	02	09	-02	-10	00	-03	-32	-01	-01	-08	-01	-02	-08	11	20
TOTPCT	-08	-15	07	25	05	14	21	-07	-11	-13	04	07	-01	13	-11	02	41
WRDKNOW	00	-09	06	13	-03	18	13	-04	02	-05	-03	06	10	14	01	04	14
RDCOMP	01	-09	-03	10	-05	09	13	-04	-00	-08	-01	-01	05	12	-04	-01	17
RDLEVL	-01	-09	02	12	-04	16	17	-04	-01	-07	-03	03	10	13	-02	00	19

	<u>CIVED</u>	<u>SERMO</u>	<u>AGE</u>	<u>WPCT</u>	<u>HPCT</u>	<u>TOTPCT</u>	<u>WRDKNOW</u>	<u>RDCOMP</u>
SERMO	18							
AGE	22	77						
WPCT	-03	05	-01					
HPCT	09	08	02	23				
TOTPCT	-01	03	-03	98	38			
WRDKNOW	05	08	03	44	24	47		
RDCOMP	12	17	12	41	24	43	67	
RDLEVL	10	15	09	46	25	49	88	92

^aDecimal points omitted.^bBreakdown of N:
level

	2	3	4
11B	99	21	11
11C	20	8	1
11D	1	1	1
11E	58	34	0

Demographic Variables and Test Scores

SQT scores are not significantly related to years of education, time in the Army, or age. Senior service members seem to have a slight advantage on Reading Comprehension ($r = .17$) but not on Word Knowledge. Education seems to have little or no relationship with reading scores, nor does age.

Questionnaire Items

There were many significant correlations between questionnaire responses. Therefore, a factor analysis was conducted for a larger sample, including all cases available in the data base ($N = 529$). The analysis was done using a varimax rotation with Program BMDP4M.² The correlation matrix is presented in Table 3-2, and the rotated factor loadings in Table 3-3. The four factors obtained explain about half the questionnaire variance (47.94%).

Factor 1 might be called "career motivation." It seems to involve satisfaction with Army career and MOS, with a priority on SQT training to further that career. Factor 2 is perhaps the easiest one to define, involving advance preparation given for SQT. All three items begin "How far in advance of the test date did..."; no other item included such a statement, or its equivalent. Factor 3 might be called "satisfaction with SQT training" that was administered (Q11-14). It also involved a tendency to feel that SQT was fair (Q3). Factor 4 may be called "comprehension" of printed material (Q8, 9). It also involved a tendency to feel that the SQT is valid (Q4). Factor 4 concerns the active role of the individual soldier in preparing for SQT, while Factor 3 focuses upon the training administered to the servicemember.

Questionnaire Items and Demographic Data

Generally the questionnaire responses were not significantly related to age, education, or length of service. However, the senior people (SERMO) seemed to take the SQT more seriously; they studied more (Q10, $r = -.21$), thought it affected their Army career (Q17, $r = -.16$), and were more satisfied with their training for the WC (Q12, $r = -.13$). They also thought training started earlier (Q7, $r = .25$), probably because senior people are responsible for giving the training, so their part does begin earlier. The same pattern of correlations appears with AGE (which is highly correlated with seniority) but the correlations are much smaller, so only two of them are significant (Q7, $r = .15$; Q10, $r = .14$).

The only correlation with civilian education that reaches our criterion of significance is Q6 ($r = .13$). There seems to be no obvious explanation for this marginally significant result.

²W. J. Dixon & M. B. Brown. BMDP-79, Biomedical computer programs (P-Series). Berkeley: University of California Press, 1979.

TABLE 3-2. Correlation Matrix^a Used For Factor Analysis Of
Questionnaire Responses (N = 529)^b

	<u>Q3</u>	<u>Q4</u>	<u>Q5</u>	<u>Q6</u>	<u>Q7</u>	<u>Q8</u>	<u>Q9</u>	<u>Q10</u>	<u>Q11</u>	<u>Q12</u>	<u>Q13</u>	<u>Q14</u>	<u>Q15</u>	<u>Q16</u>	<u>Q17</u>	<u>Q18</u>	<u>Q19</u>
Q4	22																
Q5	-12	-14															
Q6	-15	-12	55														
Q7	-07	-11	51	41													
Q8	-06	-08	08	06	01												
Q9	-22	-20	13	12	11	39											
Q10	04	-01	-13	-15	-08	24	14										
Q11	16	13	-03	-04	01	05	-01	16									
Q12	25	16	-08	-07	-06	05	-15	17	37								
Q13	16	17	-04	-06	-08	03	-05	07	22	30							
Q14	18	07	02	-03	09	09	-01	25	30	29	25						
Q15	06	12	-02	-04	-09	03	08	24	11	16	17	35					
Q16	05	07	01	01	-03	13	09	27	16	16	19	40	57				
Q17	12	09	-03	-14	-08	04	03	31	12	09	22	35	38	48			
Q18	-05	01	-04	01	-02	04	-03	13	-02	07	04	11	06	18	08		
Q19	-17	-11	08	16	02	16	22	-10	-10	-18	02	-05	-08	-01	-15	03	

^aDecimal points omitted.

^bBreakdown of N:
level

	2	3	4
11B	210	68	33
11C	42	16	3
11D	1	1	1
11E	98	54	2

TABLE 3-3. Sorted Rotated Factor Loadings (Pattern)^a

	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>	<u>Factor 4</u>
Q16	.81			
Q15	.80			
Q17	.75			
Q14	.52		.45	
Q5		.84		
Q7		.79		
Q6		.78		
Q12			.76	
Q11			.70	
Q13			.51	
Q8				.76
Q9				.74
Q10				.46
Q3			.50	
Q4				-.38
% Variance				
Explained	14.00	12.18	11.88	9.88

^aThe above factor loading matrix has been rearranged so that the columns appear in decreasing order of variance explained by factors. The rows have been rearranged so that for each successive factor, loadings greater than 0.50 appear first. Loadings less than 0.35 have been omitted.

Questionnaire Responses vs. Test Scores

(The questionnaire factors presented in Table 3-3 may be related to the various test scores as follows.)

Factor 1 ("career motivation") is virtually unrelated to test scores. The only significant correlations are with Q16, and those are negative: people who are satisfied with their Army career tend to do slightly worse on WPCT ($r = .13$) and WRDKNOW ($r = .14$). (These correlations are of marginal significance.) Apparently, seriousness about Army career has no appreciable effect upon SQT performance.

From Factor 2 ("How far in advance..."), Q6 is related to WPCT ($r = .26$), indicating that having the SM in time to study is important. Question 6 also seems to be correlated with WRDKNOW ($r = .13$) but there seems to be no apparent explanation.

From Factor 3 ("Satisfaction with SQT training"), Q12 correlates with WPCT ($r = -.14$), indicating that satisfaction with WC training is related marginally to performance on the corresponding test. Question 11 correlated with HPCT ($r = -.32$), indicating that satisfaction with HOC training is related substantially to performance on the corresponding test. No other correlation of Factor 3 variables with test scores is significant. Apparently, differences in perceived quality of training are not crucial for SQT.

All Factor 4 ("comprehension") variables are significantly related to WPCT (Q9, $r = .24$; Q8, $r = .17$; Q4, $r = -.15$). People who say they can understand the SM and WC perform better. People who think that SQT is valid (Q4) are those who score higher on WPCT ($r = -.15$) and also on HPCT ($r = .17$). People who say they understand the SM and WC questions also do better on the reading tests ($r = .16$ and $.17$ with RDLEVL).

Question 19 ("How well do you think you did on SQT") correlates highly with WPCT ($r = .40$), with HPCT ($r = .20$) and with TOTPCT ($r = .41$). Clearly, people can estimate pretty well how they did immediately after taking the test. However, these correlations are considered to be of little practical significance for success on these tests, and perhaps misleading.

Stepwise Regression

A stepwise regression analysis was conducted using Program BMOP2R³ for the questionnaire responses, with WPCT as the dependent variable. Question 19 was omitted because it seemed misleading (as noted above) and because it was correlated substantially with the dependent variable. The analysis was done first for all MOS, then for each MOS separately. Table 3-4 summarizes these analyses.

The significant variables in these analyses generally confirm the significance of the correlations discussed above. Question 6 (getting their SM in time to study for SQT) emerges as the most important item for performance on WC. Understanding the SM and the WC (Q8, 9) is also generally important. Independent study (Q10) also is significant for WC. (The corresponding correlation was not significant for the smaller sample presented in Table 3-1.)

³Dixon & Brown, op cit.

TABLE 3-4. Stepwise Regression

Minimal acceptable F to enter... 4.0

SUMMARY TABLE: All MOS ($N = 534$)

Step No.	Variable Entered	Variable Removed	Multiple R	Multiple RSQ	Increase in RSQ	F-to-Enter
1	Q6		.28	.08	.08	44.57
2	Q9		.31	.10	.02	12.16
3	Q10		.33	.11	.01	7.11
4	Q8		.35	.12	.01	5.60

$$E(WPCT) = 36.136 + 2.005(Q6) + 2.664(Q9) - 2.639(Q10)$$

SUMMARY TABLE: 11B ($N = 317$)

Step No.	Variable Entered	Variable Removed	Multiple R	Multiple RSQ	Increase in RSQ	F-to-Enter
1	Q6		.25	.06	.06	21.78
2	Q9		.30	.09	.02	8.48
3	Q5		.33	.11	.02	6.24
4	Q10		.35	.13	.02	5.63
5	Q8		.37	.14	.01	5.28

$$E(WPCT) = 40.380 - 1.554(Q5) + 2.7441(Q6) + 2.893(Q8) - 2.998(Q10)$$

SUMMARY TABLE: 11C ($N = 62$)

Step No.	Variable Entered	Variable Removed	Multiple R	Multiple RSQ	Increase in RSQ	F-to-Enter
1	Q6		.41	.17	.17	12.37
2	Q9		.49	.24	.07	5.16
3	Q10		.55	.31	.07	5.84
4	Q16		.60	.36	.05	4.59

$$E(WPCT) = 21.789 + 2.335(Q6) + 6.631(Q9) + 6.388(Q10) + 2.294(Q16)$$

SUMMARY TABLE: 11D ($N = 2$)

INSUFFICIENT CASES FOR ANALYSIS

SUMMARY TABLE: 11E ($N = 153$)

Step No.	Variable Entered	Variable Removed	Multiple R	Multiple RSQ	Increase in RSQ	F-to-Enter
1	Q6		.27	.07	.07	11.66

$$E(WPC) = 44.657 + 1.956(Q6)$$

Getting the Soldier's Notice in time to study (Q5) was significant only for 11B. Satisfaction with Army career (Q16) appeared as a significant step for 11C only; this seems strange since those who do well on WC would appear to be more dissatisfied with their Army career. (The correlation was positive, $r = .32$.) It may be a chance result: the 5% confidence interval of r for $N = 62$ is about $\pm .25$, and the 1% confidence interval, about $\pm .33$.⁴

Satisfaction with WC training (Q12) did not appear in the stepwise regression, although the correlation was marginally significant in the correlation matrix (Table 3-1) discussed above. No other inconsistencies were noted between the stepwise regression and the correlational analysis discussed previously.

A Model Relating the Significant Variables

The significant correlations involving WPCT seem to suggest a model relating the variables that were crucial for success on the written tests. The model traces the dissemination of task information from an authoritative source to the soldier's correct responses on the test.

First, the soldier must get his Soldier's Manual in time to study it before the test (Q6). It may also help if he gets his Soldier's Notice telling him what to study (Q5) in the SM. It helps if he studies on his own (Q10) and he must be able to understand what he reads (Q8 and RDLEVL). He must also be able to understand the written questions when he takes the test (Q9 and RDLEVL).

It does not seem to make much difference whether the soldier likes his career (Q16) or his MOS (Q15). Nor does it matter much whether he thinks SQT is important for his career (Q17) or fair (Q3).

It did not make much difference whether the SQT training the soldier received seemed good or bad (Q11, Q12, Q13, Q14). (However, there is a slight correlation when his judgments are specific to WC training.) This trend would seem to minimize the importance of differences in the unit's formal training programs. However, the training might seem more critical if a greater range of programs were included. Also, these judgments may be more global and subjective and, hence, unreliable, than some other questions (like whether he could understand the questions on WC).

It does seem critical to insure that the Soldier's Manuals be available, and that they should include all task information needed to pass the test expressed in a comprehensible form. The WC should also be comprehensible, and the necessary reading limited to what is needed for the job.

⁴Beyer, *op. cit.*, pp 393-393.

Item Analysis

For each question in the 11B2 WC, the average reading level of those who were correct was compared with the average for those who were wrong. Those comparisons would indicate which items were especially dependent upon reading ability, and which were not. The correct and incorrect groups on each item were also compared on total WC score, to determine which items were most discriminating. Significance was determined by t-tests, using a pooled estimate of the variance.⁵

The 11B2 test analysis was selected because that was the test with the largest N. Comparable analyses were also conducted in other WCs, and results were similar, except for irregularities and lower significance levels because of fewer data.

The vast majority of items were statistically significant discriminators on total WC score and, to a lesser extent, on reading level. On total WC scores, 157 questions were significant discriminators, 7 were positive but not significant, and there was 1 reversal. On reading level, 116 questions were significant discriminators, 41 were positive but not significant, and there were 8 reversals. There were another four questions that no one missed. The greater significance on total WC score was due to the greater N (401 vs. 197) as well as dissimilarities between the tests.

None of the reversals on either criterion was statistically significant. The one reversal on total WC score (Q23-3) was also a reversal on reading level. Most people (70%) also missed that item. That was the only item that the data even suggested might be scored wrong or be generally misleading. There were only 15 items that were missed by more than half of the people.

The test content was examined to determine what characteristics were associated with discrimination on either criterion. No such characteristics were readily apparent. Nor are there many items that are highly discriminating on one criterion but not on the other. The form and content of the questions will be analyzed in another report.

⁵Dixon & Brown, op. cit., pp 172-173.

Chapter 4

SUMMARY AND CONCLUSIONS

Correlations Among Tests

SQT scores for infantrymen and armor crewmen (11B, 11C, and 11E) were correlated with scores on a standard reading test and with questionnaire responses to determine what factors were associated with success on SQT. In particular, the data were analyzed to evaluate the common complaint that the multiple-choice questions (WC) measured reading ability that was unrelated to performance of their jobs.

Performance on WC is moderately correlated with reading ability, but some of that correlation may be explained by the fact that any test scores are apt to correlate to some degree. Even the SQT performance test (HOC) correlated significantly with the reading test, but not so highly as the multiple-choice part did.

Demographic Data

Test scores generally did not correlate significantly with demographic data (civilian education, age, or time in service). The one exception was a slight tendency for those longer in the service to score higher on one section of the reading test ($r = .17$).

Neither did these demographic data correlate generally with questionnaire responses. However, there was a slight pattern indicating that senior soldiers tended to take SQT a little more seriously.

Questionnaire Data and SQT Scores

A factor analysis of questionnaire responses revealed four factors:

1. Career motivation (investment in an Army career). This seems virtually unrelated to test scores.
2. Advance preparation for SQT. Each of these questions involved how far in advance of SQT did some training event occur. The only thing that made an appreciable difference was getting the Soldier's Manual in time to study for the WC.
3. Satisfaction with SQT training. Soldiers who were satisfied with their training for WC or HOC tended to do a little better on that particular component of the SQT. But generally, their SQT scores were unrelated to their opinions on the quality of training they received.
4. Comprehension. Soldiers who said they could understand WC questions or their SM tended to score better on all tests.

Item Analysis

Item analysis of the 11B2 WC indicated consistently good quality of test item, i.e., those who got an item right also tended to have a high total score. Almost all items (95%) were significant discriminators, and only one item showed a reversal. This indicates that no question was consistently misleading.

Conclusion

The criticism that SQT scores reflect mostly reading ability rather than job skills is not valid. However, test developers should continue trying to simplify the wording of questions, because the scores do reflect reading ability to some degree.

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SURVEY FORM

DATA REQUIRED BY THE PRIVACY ACT OF 1974

TITLE: SQT Opinion Survey

PRESCRIBING DIRECTIVE: AR 70-1

AUTHORITY 10 USC Sec 4503

PURPOSE(s): The data collected with the attached forms are to be used for research purposes only.

This is an experimental personnel data collection form developed by the U.S. Army Research Institute for the Behavioral and Social Sciences pursuant to its research missions as prescribed in AR 70-1. When identifiers (name or Social Security Number) are requested they are to be used for administrative and statistical control purposes only. Full confidentiality of the responses will be maintained in the processing of these data.

Your participation in this research is strictly voluntary. Individuals are encouraged to provide complete and accurate information in the interests of the research, but there will be no effect on individuals for not providing all or any part of the information.

SQT Opinion Survey

INSTRUCTIONS

The purpose of this questionnaire is to obtain your opinions about the Skill Qualification Test (SQT) which you recently took and about the training which you received to prepare you for the test. Your responses are very important because they will be used to help improve the SQT and SQT training procedures. Please be as accurate and honest as you can when answering all of the items in the questionnaire. Your responses to this questionnaire are being collected for research purposes and the confidentiality of your responses will be maintained. Please answer all the questions on the answer sheet provided. Do not write in the questionnaire booklet. It is important that you fill out the answer sheet very carefully.

1. Last Name: (Enter on the answer sheet)
2. Social Security Number: (Enter on the answer sheet)
3. Do you feel that your performance on the SQT will be a good indication of your proficiency in your MOS? (Choose one)
 - A. Yes
 - B. No
4. Do you feel that the SQT was administered fairly? (Choose one)
 - A. Yes
 - B. No
5. How far in advance of the test date did you receive your SQT notice telling you which tasks from the Soldier's Manual would be on the SQT? (Choose one)
 - A. I did not receive an SQT notice
 - B. Less than one month
 - C. One month or more, but less than two months
 - D. Two months or more, but less than three months
 - E. Three months or more, but less than four months
 - F. Four months or more, but less than five months
 - G. Five months or more, but less than six months
 - H. Six months or more
6. How far in advance of the test date did you receive your Soldier's Manual? (Choose one)
 - A. I did not receive an SQT notice
 - B. Less than one month
 - C. One month or more, but less than two months
 - D. Two months or more, but less than three months
 - E. Three months or more, but less than four months
 - F. Four months or more, but less than five months
 - G. Five months or more, but less than six months
 - H. Six months or more

7. How far in advance of the test date did your unit begin training for the SQT? (Choose one)
- A. My unit did not conduct any SQT training
 - B. Less than one month
 - C. One month or more, but less than two months
 - D. Two months or more, but less than three months
 - E. Three months or more, but less than four months
 - F. Four months or more, but less than five months
 - G. Five months or more, but less than six months
 - H. Six months or more
8. Did you have any difficulty understanding the Soldier's Manual while preparing for the SQT? (Choose one)
- A. Extreme difficulty
 - B. Moderate difficulty
 - C. Slight difficulty
 - D. No difficulty
 - E. I did not read the Soldier's Manual
9. Did you have any difficulty understanding the questions in the Written Component of the SQT? (Choose one)
- A. Extreme difficulty
 - B. Moderate difficulty
 - C. Slight difficulty
 - D. No difficulty
10. Did you do any studying on your own to prepare yourself to take the SQT? (Choose one)
- A. An extreme amount
 - B. A moderate amount
 - C. A slight amount
 - D. None at all
11. How satisfied or dissatisfied are you with the training you received for the Hands-On Component of the SQT? (Choose one)
- A. Extremely satisfied
 - B. Moderately satisfied
 - C. Slightly satisfied
 - D. Slightly dissatisfied
 - E. Moderately dissatisfied
 - F. Extremely dissatisfied
12. How satisfied or dissatisfied are you with the training which you received for the Written Component of the SQT? (Choose one)
- A. Extremely satisfied
 - B. Moderately satisfied
 - C. Slightly satisfied
 - D. Slightly dissatisfied
 - E. Moderately dissatisfied
 - F. Extremely dissatisfied

13. How qualified or unqualified was your immediate supervisor to train you for the SQT? (Choose one)
- A. Extremely qualified
 - B. Moderately qualified
 - C. Slightly qualified
 - D. Slightly unqualified
 - E. Moderately unqualified
 - F. Extremely unqualified
14. How much did you like or dislike training for the SQT? (Choose one)
- A. Liked extremely
 - B. Liked moderately
 - C. Liked slightly
 - D. Disliked slightly
 - E. Disliked moderately
 - F. Disliked extremely
15. How much do you like or dislike your MOS? (Choose one)
- A. Like extremely
 - B. Like moderately
 - C. Like slightly
 - D. Dislike slightly
 - E. Dislike moderately
 - F. Dislike extremely
16. Overall, how satisfied or dissatisfied are you with your Army career? (Choose one)
- A. Extremely satisfied
 - B. Moderately satisfied
 - C. Slightly satisfied
 - D. Slightly dissatisfied
 - E. Moderately dissatisfied
 - F. Extremely dissatisfied
17. How important or unimportant do you feel that your SQT performance will be to your Army career? (Choose one)
- A. Extremely important
 - B. Moderately important
 - C. Slightly important
 - D. Slightly unimportant
 - E. Moderately unimportant
 - F. Extremely unimportant

18. Do you intend to reenlist? (Choose one)
- A. Yes
 - B. No { See Note }
 - C. Undecided
19. Overall, how well do you think you did on the SQT? (Choose one)
- A. Passed less than 60% of the tasks
 - B. Passed 60-79% of the tasks (Qualified in MOS)
 - C. Passed 80-100% of the tasks (Promotable in MOS)

PLEASE COMPLETE QUESTIONS 20 THRU 23 WHICH ARE ATTACHED TO THE ANSWER SHEET.

*The answer choices to this item were inadvertently sequenced, so they do not correspond to the underlying dimension of inclination to re-enlist. Therefore, correlations with this item should be interpreted in terms of Army career intentions.