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Academic Preparation, Aptitude Measures and Army Officer Performance

↘ Earlier exploratory research indicated that officers with different academic backgrounds (i.e., college majors) performed differently on certain measures of duty performance. The purpose of this research was to extend the scope of this earlier research by evaluating the effects of academic preparation on the relevant performance measures when the differences in aptitude are controlled. A sample of officers were divided into five groups on the basis of the major field of study pursued as an undergraduate. Comparison was made among these five groups on several performance measures while using certain measures of aptitude as covariates. Discussion of the findings and implications of these findings will be presented.

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ACADEMIC PREPARATION, APTITUDES MEASURES AND ARMY OFFICER PERFORMANCE

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Knowledge of the contribution that academic preparation makes to the performance of Army officers in actual duty performance could lead to assignment strategies that would enhance officer utilization and career progression. Earlier research (Gilbert, Waldkoetter & Castelnovo, 1978) explored the differences among officers in the Field Artillery branch who pursued different undergraduate college majors in Officer Basic Course and on the average Officer Efficiency Report (OER) ratings during the first year of active duty. The results of that research did not indicate any statistically significant differences among the different college major groups on the criterion variables. Subsequent research (Gilbert, 1980) yielded results that indicated differences among officers with different academic branches for a sample of officers from all of the 13 Career Branches on certain aptitude and duty performance measures. Within the different types of branches (i.e., Combat Arms, Combat Support and Combat Service Support branches) differences on certain measures of aptitude and duty performance were also obtained. In both of these investigations, the analysis of variance technique was employed and consequently the effect of aptitude measures on duty performance was not controlled.

This research extends the scope of these earlier research efforts. This investigation was designed to evaluate the differences in duty performance measures while taking into account the effect of certain aptitude measures predictive of performance on these measures. These differences were evaluated (1) within the total sample of officers in all of the 13 career branches, disregarding the type of career branch to which the officers were assigned, and (2) within groupings of the career branches (i.e., Combat Arms, Combat Support, and Combat Service Support).

METHOD

A sample of officers who completed Officer Basic Course (OBC) and who entered on a tour of active duty after completion of that course were used as subjects for this research. Officers were divided into five groups on the basis of the curriculum that they pursued as undergraduates. These college major groups were Humanities, Business, Engineering, Physical Science, and Social Science.

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¹The views expressed in this paper are those of the authors and do not necessarily reflect the view of the US Army Research Institute or the Department of the Army.

The criterion measures used consisted of three types. The first set of criterion measures consisted of measures obtained in Officer Basic Courses (OBC); these measures were the final course grades obtained for the course and the peer ratings obtained at the end of the course. The second set of criterion measures were the ratings obtained on a specially constructed Performance Evaluation Form (Gilbert & Grafton, 1976) which was based on research reported by Helme, Willemin, and Grafton (1971), Fleishman (1974), Stogdill (1974) and Willemin (1965). This instrument yielded a global measure of duty performance and measures along nine separate dimensions of Army officer performance. Ratings on each of these dimensions were obtained after 12 to 18 months of duty performance from each officer's immediate supervisor, from a senior officer who had knowledge of the officer's performance (but not necessarily the endorsing officer for Officer Efficiency Report purposes) and from two close associates. These four ratings were averaged for each of the 10 measures obtained from the instrument.

The third set of measures consisted of the annual average Officer Efficiency Report (OER) ratings for each of the first three years of active duty and the average Officer Efficiency report rating across all three years.

The aptitude measures used as control variables were obtained from the Officer Evaluation Battery (OEB). In an earlier research effort the utility of the Officer Evaluation Battery is presented (Gilbert, 1977). The three aptitude scales of this instrument are the Combat Leadership (Cognitive), Technical Managerial (Cognitive), and Career Potential (Cognitive) scales. The multiple correlations between these three measures and each of the performance measures are shown in Table 1.

Two sets of separate but parallel analyses were performed for each of the performance measures. One set of analyses consisted of an analysis of variance for each measure. The other set of analyses consisted of an analysis of covariance for each measure using the three Officer Evaluation Battery aptitude measures as predictors. Only those officers for whom all three covariates and the relative performance measure were available were used as subjects in these analyses. These two sets of analyses were performed for the total sample disregarding career branch. Officers were then divided as basis of membership in the three types of career branches: Combat Arms, Combat Support, and Combat Service Support. The performance of the five groups of majors within each type of career branch was then compared using the analysis of variance and the analysis of covariance techniques.

RESULTS AND DISCUSSION

In Table 2 are shown the means of the five college major groups for the total sample on all performance measures and the corresponding F-ratios indicating the difference among these group means by analysis of variance. Also, shown in Table 2 are the adjusted group means for the different performance measures resulting from the analysis of covariance using the three aptitude measures as covariates and the corresponding F-ratios for these analyses.

Table 1

Multiple Correlations between The Three Aptitude Measures and Each Performance Measure

Performance Measure	Multiple Correlation
Officer Basic Course Grade	.40**
Peer Ratings	.15**
Duty Performance	.12**
Combat Leadership	.22**
Technical Managerial Leadership	.09**
Tactical Knowledge	.23**
Understanding Mission	.10**
Making Decisions	.12**
Defining Subordinate Roles	.06
Planning and Organizing	.07*
Motivating Troops	.11**
Logistical Knowledge	.13**
Annual OER Rating - 1974	.06*
Annual OER Rating - 1975	.07*
Annual OER Rating - 1976	.05
Weighted Average OER	.06*

*Significant at the .05 level.

**Significant at the .01 level.

Table 2

Means and Adjusted Means for the Five Groups of College Majors on Duty Performance Measures for the Total Sample

Variable	Group Mean					F	Adjusted Group Mean					F
	H N-292	B N-725	E N-386	PS N-1370	SS N-1428		H N-292	B N-725	E N-386	PS N-1370	SS N-1428	
Officer Basic Course Grade	99.06	99.51	106.93	100.54	97.99	11.86**	101.80	102.08	104.16	97.94	100.03	8.13**
Peer Rating Final Score	97.24	100.84	102.39	100.24	99.37	3.38**	98.07	100.78	102.27	99.86	99.63	2.21
Duty Performance	99.11	101.87	99.95	100.85	98.37	2.13	100.01	102.01	99.69	100.49	98.65	1.62
Combat Leadership	93.46	99.07	98.68	104.48	97.48	16.64**	94.96	99.03	98.66	104.05	97.75	11.66**
Technical/Managerial Leadership	98.67	102.97	102.27	100.37	97.88	4.20**	99.50	103.62	101.54	99.71	98.44	3.77**
Tactical Knowledge	92.96	97.94	98.53	104.72	97.47	19.14**	94.71	98.26	98.29	103.99	97.96	11.84**
Understanding Mission	98.42	102.15	99.62	100.87	98.33	2.53*	99.12	102.05	99.61	100.73	98.43	2.07
Making Decisions	96.68	101.40	98.71	102.13	98.13	5.06**	97.41	101.14	98.78	102.07	98.16	4.14**
Defining Subordinate Roles	100.16	101.86	98.92	100.62	98.63	1.74	100.58	101.80	98.82	100.54	98.71	1.62
Planning & Organizing	99.34	102.43	101.11	100.13	98.84	1.83	99.96	102.51	100.99	99.90	99.00	1.67
Motivating Troops	98.13	101.91	97.88	100.32	98.98	1.88	98.21	101.26	99.08	100.69	98.41	1.68
Logistical Knowledge	94.81	102.89	102.55	100.68	98.61	5.47**	95.97	103.69	101.43	99.83	99.35	4.33**
Annual OER Scores												
1974	99.74	100.52	100.08	102.00	98.42	5.61**	99.97	100.47	100.33	101.92	98.41	4.90**
1975	98.08	100.16	98.68	101.56	99.78	3.01*	98.31	99.99	99.29	101.57	99.63	2.50*
1976	100.99	99.88	97.01	101.21	98.71	3.45**	101.10	99.52	97.42	101.42	98.53	3.66**
Weighted OER Scores	100.11	100.62	100.04	101.17	98.71	2.92*	100.43	100.50	100.26	101.11	98.71	2.62*

*Indicates a significant difference among groups at the .05 level.

**Indicates a significant difference among groups at the .01 level.

Sample size varies in analyses.

H- Humanities
B- Business
E- Engineering
PS- Physical Science
SS- Social Science

Differences were obtained among the five groups of college majors for the Officer Basic Course final grades using both the analysis of variance and the analysis of covariance techniques. In both analyses the differences were significant at the .01 level and the Engineering majors were favored. Significant differences were obtained among the means of the five groups for the peer ratings received in Officer Basic Course using the analysis of variance technique; these differences were significant at the .01 level and the Engineering majors were favored on this variable. However, the results of the analysis of covariance using this measure as the criterion failed to indicate any differences among the group means.

Results of the analysis of variance and the analysis of covariance yielded significant differences among the group means for five of the dimensions of duty performance as measured by the Performance Evaluation Form at the .01 level. These differences were obtained for Combat Leadership, Technical Managerial Leadership, Tactical Knowledge, Making Decisions, and Logistical Knowledge. Physical Science majors were favored in the Combat Leadership, Tactical Knowledge, and Making Decisions dimensions. However, business majors were favored on Technical Managerial and Logistical Knowledge ratings. Use of the analysis of variance technique resulted in a difference among the group means on the Understanding of Mission dimension at the .05 level on which Business majors were favored but analysis of covariance failed to show a difference among the five group means on this dimension.

On Officer Efficiency Report ratings differences were obtained among the five groups for each year average using both the analysis of variance and analysis of covariance techniques. The differences among group means were significant at the .01 level for the 1974 and 1976 annual average ratings and the .05 for the 1975 annual average rating. Differences among the group means for the three-year Officer Efficiency Report annual average at the .05 level. The mean of the Physical Science majors was highest on all four Officer Efficiency Report indices.

The means and the adjusted means resulting from the analysis of covariance for the five college major groups in the Combat Arms branches are shown in Table 3. The analysis of variance did not reveal significance among the means of the groups for Officer Basic Course final grades but the results of the analysis of covariance yielded significance at the .01 level. The mean of Engineering majors was slightly higher than that of Business majors and these two groups were favored over the others on this variable. The use of either analytic approach failed to reveal differences for the five college major groups in the Combat Arms for any of the dimensions of the Performance Evaluation Form with the exception of Logistical Knowledge. On this variable the analysis of variance approach failed to yield significance but the analysis of covariance yielded significant differences among the group means at the .05 level; the mean performance of Business majors was favored. On Officer Efficiency Report measures similar differences were obtained among the five groups using the analysis of variance and the analysis of covariance approaches in the Combat Arms branches. For the 1974 and 1975 Annual Officer Efficiency Report averages and for the three year average differences were obtained at the .01 level

Table 3

Means and Adjusted Means for the Five Groups of College Majors on Duty Performance Measures for the Combat Arms Branches

Variable	Group Mean					F	Adjusted Group Mean					F
	H N-113	B N-380	E N-110	PS N-979	SS N-759		H N-113	B N-380	E N-110	PS N-979	SS N-759	
Officer Basic Course Grade	100.67	102.32	106.37	99.84	101.55	2.12	102.60	104.28	104.75	98.30	102.64	6.23**
Peer Rating Final Score	99.04	99.68	100.39	99.36	99.16	.14	99.28	99.55	101.04	99.43	99.01	.87
Duty Performance	97.86*	103.64	102.33	100.87	100.21	1.21	98.46	103.84	102.11	100.67	100.41	1.15
Combat Leadership	100.88	103.63	101.82	105.99	103.13	2.14	101.36	105.63	101.81	105.94	103.15	1.83
Technical/Managerial Leadership	95.72	103.10	99.91	99.46	98.48	2.06	96.78	103.89	99.33	98.82	99.15	2.35
Tactical Knowledge	101.56	104.50	103.34	106.59	103.95	1.85	102.49	104.88	102.86	106.22	104.34	.98
Understanding Mission	97.50	104.49	102.62	101.13	99.77	2.02	97.96	104.68	102.43	100.95	99.96	1.93
Making Decisions	96.65	103.20	103.27	102.27	100.69	2.45*	96.89	105.17	103.38	102.28	100.64	2.37
Defining Subordinate Roles	100.21	102.83	102.29	100.44	98.92	1.17	100.44	102.92	102.04	100.34	99.06	1.09
Planning & Organizing	96.88	103.13	101.46	99.62	99.49	1.47	97.60	103.54	101.15	99.27	99.85	.17
Motivating Troops	99.97	104.46	100.91	100.52	100.53	1.31	100.13	104.46	101.53	100.58	100.33	1.31
Logistical Knowledge	97.38	103.68	99.18	99.62	99.21	1.73	98.64	104.56	98.17	98.86	100.08	2.46*
Annual OER Scores												
1974	99.46	101.97	101.92	102.90	98.90	4.13**	99.56	102.14	102.46	102.80	98.86	3.86**
1975	94.74	101.42	100.51	102.50	99.88	4.60**	94.90	101.44	101.21	102.49	99.77	4.31**
1976	101.67	100.93	98.43	101.86	98.52	2.40*	101.69	100.73	98.90	101.98	98.37	2.47*
Weighted OER Scores	98.80	101.80	99.89	102.00	98.56	4.10**	98.90	101.77	100.40	102.03	98.45	4.09**

*Indicates a significant difference among groups at the .05 level.

**Indicates a significant difference among groups at the .01 level.

Sample size varies in analyses.

H= Humanities
B= Business
E= Engineering
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while for the 1976 annual average the differences among group means was significant only at the .05 level. The means of the Physical Science majors was favored on all of these indices.

The results of the analysis of variance and for the analysis of covariance is shown in Table 4 for the five college groups in the Combat Support branches. Results of both the analysis of variance and of analysis of covariance yielded significant differences on Officer Basic Course grades at the .01 level, and in both analyses, the mean of engineering majors was favored. On the Combat Leadership and Tactical Knowledge dimensions of the Performance Evaluation Form, differences were obtained among the means of the five groups at the .01 level, and in both instances, physical science majors were favored. Significance was also obtained at the .01 level in the analysis of variance on the Technical-Managerial Leadership dimension, and at the .05 level in the analysis of covariance on the Decision-Making dimension. Engineering majors were favored on the Technical-Managerial Leadership dimension, and physical science majors were favored on the Decision-Making dimension. Differences were not obtained among the means of the five college majors on the four Officer Efficiency Report indices.

The results of the analyses for the five college major groups are shown in Table 5 for the officers in the Combat Service Support branches. The difference among the group means on Officer Basic Course final grades was significant at the .01 level using the analysis of variance approach; the mean of the Engineering group was highest. However, the results of the analysis of covariance indicated differences significant at the .05 level and the adjusted mean of the Business majors was highest. Results of the analysis of variance indicated significance among the groups for peer ratings at the .05 level on which Physical Science majors were favored; however, the results of the analysis of covariance failed to indicate differences among the groups on that measure. Analysis of variance results yielded differences at .05 level for three of the dimensions of the Performance Evaluation Form. These differences were obtained for the Combat Leadership, Tactical Knowledge, and Logistical Knowledge dimensions and Physical Science majors were favored on all three dimensions. The results of the analysis of covariance, however, failed to indicate any difference among the five groups in the Combat Service Support branches on those measures. Neither the results of the analysis of variance or of the analysis of covariance indicated any differences among the means of the five groups on the Officer Efficiency Report annual ratings or for the three-year average of Officer Efficiency Report ratings.

In summary, Engineering majors received higher Officer Basic Course grades in the total sample, in the Combat Arms branches and in the Combat Support branches while Business majors received higher Officer Basic course grades in the Combat Service Support branches. This may be due to the relevance of these college curricula to the curricula of the Officer Basic Courses. Business majors were favored on the Technical Managerial ratings in the total sample and in the logistical knowledge ratings in the total sample and in the Combat Arms branches. These results are to be expected since both dimensions are characteristic of staff-managerial functions. However, Physical Science majors were favored on logistical knowledge ratings in the Combat Service Support branches. Physical Science majors

Table 4

Means and Adjusted Means for the Five Groups of College Majors on Duty Performance Measures for the Combat Support Branches

Variable	Group Mean					F	Adjusted Group Mean					F
	H N-97	B N-110	E N-229	PS N-271	SS N-372		H N-97	B N-110	E N-229	PS N-271	SS N-372	
Officer Basic Course Grade	97.71	96.52	107.71	102.08	95.39	14.72**	101.34	97.04	104.46	98.70	98.63	4.34**
Peer Rating Final Score	98.35	103.91	103.96	102.26	100.76	1.53	99.49	103.66	103.39	101.72	101.34	.71
Duty Performance	100.65	100.41	99.50	100.38	95.62	1.41	101.21	99.64	99.18	100.78	95.75	1.25
Combat Leadership	94.13	99.14	100.43	102.81	92.99	5.72**	94.85	97.85	100.25	103.21	92.99	5.18**
Technical/Managerial Leadership	99.64	100.59	104.15	102.37	95.17	3.53**	100.54	100.66	103.01	101.92	96.09	1.88
Tactical Knowledge	94.17	100.14	99.84	102.04	92.60	5.59**	94.80	99.27	99.73	102.16	92.70	4.92**
Understanding Mission	100.70	103.40	100.22	100.05	95.75	1.71	101.09	102.33	100.31	100.50	95.55	1.62
Making Decisions	98.83	99.53	97.87	102.16	95.49	2.15	99.21	98.13	97.90	102.91	95.15	2.63*
Defining Subordinate Roles	98.82	100.45	99.12	101.03	96.84	.84	99.23	99.53	98.98	101.44	96.76	.87
Planning & Organizing	99.40	101.13	101.56	101.87	97.38	1.04	99.47	99.94	102.10	102.55	96.79	1.39
Motivating Troops	98.96	102.39	98.94	100.34	96.27	1.17	98.80	100.80	99.92	101.37	95.24	1.70
Logistical Knowledge	93.99	102.28	103.87	102.95	97.41	3.13	94.60	102.04	103.22	102.81	97.90	2.10
Annual OER Scores												
1974	101.78	99.28	100.42	100.58	97.81	1.35	102.21	98.71	100.12	100.84	97.87	1.42
1975	101.52	100.24	98.33	100.51	101.14	1.03	101.81	100.13	98.39	100.41	101.12	.90
1976	99.41	97.63	95.34	99.29	100.20	1.94	99.44	97.07	95.22	99.92	99.81	1.96
Weighted OER Scores	102.50	98.66	100.65	100.82	99.69	.66	103.02	98.23	100.25	100.89	98.89	.87

*Indicates a significant difference among groups at the .05 level.

**Indicates a significant difference among groups at the .01 level.

Sample size varies in analyses.

H- Humanities
B- Business
E- Engineering
PS- Physical Science
SS- Social Science

Table 3

Means and Adjusted Means for the Five Groups of College Majors on Duty Performance Measures for the Combat Service Support Branches

Variable	Group Mean					F	Adjusted Group Mean					F
	H N=82	B N=235	E N=47	PS N=120	SS N=297		H N=82	B N=235	E N=47	PS N=120	SS N=297	
Officer Basic Course Grade	98.71	96.62	103.92	101.79	90.27	5.81**	100.67	97.90	96.75	92.66	2.63*	
Peer Rating Final Score	93.21	101.42	98.99	103.06	98.25	2.97*	101.33	97.17	101.26	99.08	1.85	
Duty Performance	99.26	100.32	97.74	101.34	96.91	.66	100.31	97.04	100.51	97.26	.48	
Combat Leadership	83.39	90.51	86.79	93.76	87.29	2.56*	90.13	85.80	92.37	88.06	1.34	
Technical/Managerial Leadership	101.53	104.00	98.98	104.07	99.99	.80	103.81	98.48	103.08	100.48	.55	
Tactical Knowledge	80.88	88.30	85.54	93.23	85.40	3.27*	87.85	84.75	91.82	86.19	1.75	
Understanding Mission	97.48	98.50	92.35	100.58	97.78	.79	97.64	92.47	99.93	98.44	.67	
Making Decisions	94.72	97.44	94.40	100.59	94.40	1.11	96.98	93.60	99.42	95.11	.56	
Defining Subordinate Roles	101.34	101.32	92.55	101.25	100.28	1.19	101.02	92.49	100.80	100.58	1.09	
Planning & Organizing	102.42	102.20	98.81	100.50	98.99	.51	101.99	97.76	99.24	99.62	.60	
Motivating Troops	95.01	98.40	88.80	98.24	98.30	1.54	96.67	92.27	99.80	98.32	.88	
Logistical Knowledge	92.30	102.17	103.06	105.11	98.52	2.97*	102.68	100.41	102.59	99.34	1.55	
Annual OER Scores												
1974	97.67	98.91	94.20	97.99	98.00	.74	98.81	94.19	97.95	98.06	.65	
1975	98.46	97.93	95.54	95.41	97.79	.35	97.26	97.53	96.66	97.48	.09	
1976	101.62	98.76	103.62	97.80	97.47	.97	98.48	104.53	98.21	97.41	1.12	
Weighted OER Scores	99.10	99.62	97.43	95.16	97.88	.98	99.40	97.61	95.13	97.97	.85	

*Indicates a significant difference among groups at the .05 level.

**Indicates a significant difference among groups at the .01 level.

Sample size varies in analyses.

H- Humanities
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received higher tactical knowledge ratings in the total sample, in the Combat Support and in the Combat Service Support branches and were rated higher on making decisions in the total sample and in the Combat Support branches; they also had a higher group mean on the Officer Efficiency Report (OER) indices in the total sample and in the Combat Arms branches.

The results of this research tend to indicate that certain college curricula may be more compatible than others with officer duty performance within the different types of Army career branches. The fact that these findings are not clear-cut may be due to the fact that the grouping of branches used did not provide for a homogeneous set of performance requirements and that the grouping of college majors were not sufficiently refined. Future research in this area will take those considerations into account.

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