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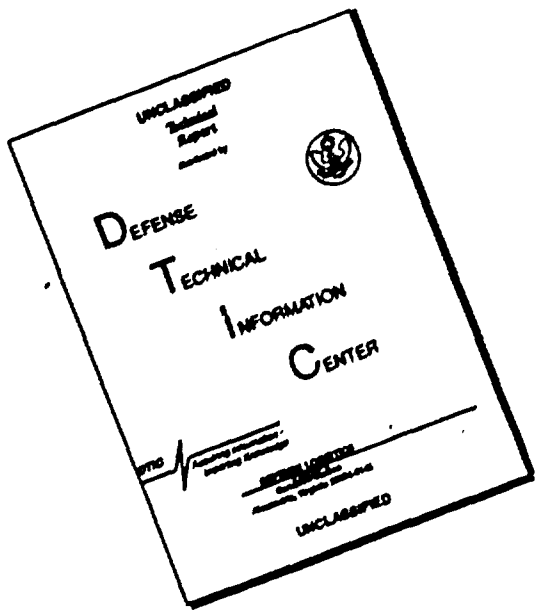

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Aviator Selection

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THE CURRENT PREDICTIVE VALIDITY OF THE FLIGHT APTITUDE SELECTION TEST

The Flight Aptitude Selection Tests (FAST), the Army's flight training selection instruments for Warrant and Commissioned Officers, were made operational in 1966. These tests have proved to be effective selection instruments. The pre- and post-FAST Flight Training success rates shown in Table 1 indicate a sizable increase following implementation of the batteries. However, because of intervening changes in flight training programs and in the population of aviation trainees, a revision of the FAST was undertaken. The present study was designed to assess the current predictive validity of the original operational battery, as a first step.

Table 2 identifies the tests that comprise the two operational composite batteries, the Warrant Officer Candidate Battery (WOCB) and the Officer Battery (OB).

The FAST battery is made up of four content areas: (1) Personality and Leadership, (2) Spatial Ability, (3) Mechanical Ability, and (4) Aviation Information. In general, the Self-Description materials obtain their validity by predicting preflight success, and cognitive items predict flying and academic success. In addition to the FAST battery, a cutting score on the General Technical Aptitude Area (GT) of the ACB is used to screen applicants for the Warrant Officer Candidate (WOC) program. Failure for academic reasons is a minor cause of attrition in training.

METHOD

SAMPLES

The grades and training dispositions of 557 students in Initial Entry Rotary Wing (IERW) classes 74-18 through 74-50 were provided by the Aviation School. (There were 50 classes in 1974 and approximately the last two-thirds of the input was sampled.) FAST answer sheets that had been forwarded to ARI from Posts and Armed Forces Examination and Entrance Stations from the years 1971-1974 were searched and 264 matches with trainee grades identified. FAST scores for less than 50% of the population were available because 60% of the 373 officer trainees were ROTC, many of whom are admitted to the IERW Program without taking the FAST OB if they have already had fixed-wing training in ROTC.

Table 1

SUCCESS RATE IN FLIGHT TRAINING

Officers	
Prior to Implementation FAST	75%
Current (1974)	90%
WO Candidates	
Prior to Implementation FAST	50%
Current (1974)	65%

Table 2

COMPOSITON OF FAST BATTERIES

Test	Officer	Warrant Officer
Biographical Information	X	
Mechanical Principles	X	
Flight Orientation	X	
Aviation Information	X	X
Helicopter Information	X	X
Mechanical Information	X	X
Mechanical Functions	X	X
Visualization of Maneuvers	X	X
Instrument Comprehension	X	X
Complex Movements	X	X
Stick and Rudder Orientation	X	X
Self-Description		X

PREDICTOR AND CRITERION VARIABLES

FAST OB and WOCS composite scores were the predictor variables of interest. The IFRW grades and course dispositions were the criterion measures. Trainees were categorized as being eliminated if they were dropped from training for reasons unrelated to the training program, such as administrative or medical causes. For purposes of analyses, all those eliminated were assigned a failing grade of 68, slightly less than one standard deviation below the minimum passing score. The practice of assigning failing grades has been demonstrated to be an unbiased method of including failures in a validity analysis while retaining linearity of regression of criterion grades on a valid predictor (Mater, 1968).

RESULTS

The means and standard deviations of FAST scores attained by aviator trainees during the original validation studies (Kaplan, 1965; Rosenberg, Martinek and Anderson, 1969) are presented in Table 3 with test scores of WOC and Officer 1974 trainees. The test scores of the more recent warrant officer trainees are generally higher than those of the original validation groups, perhaps because of the high cutting scores currently used.

Table 4 contains the means and standard deviations of FAST scores for successful and eliminated trainees. Successful officer trainees obtained significantly higher FAST composite scores than eliminated officers ($t = 2.19$; $p < .05$), with the latter given the arbitrary grade of 68. The FAST score difference between successful and eliminated WOC's was not statistically significant. The more restrictive cutting score imposed on this sample may have attenuated the effect.

The attrition rates for the samples of WOC's and officers used in this study (Table 4) differ from those shown in Table 1. The rates for these samples may be chance fluctations or reflect changing relative proportions of WOCS and officers in the program (from 2:1 in favor of WOC's during the validation period to the present ratio of about 1:1).

The means and standard deviations of flight training grades for successful WOC's and officers are presented in Table 5. The successful officers attained a nonsignificantly higher mean final grade than successful WOC's. The standard deviations for both successful groups fall between 2 and 3 points, indicating a narrow distribution of passing scores.

Table 3

MEAN AND STANDARD DEVIATION OF WOC AND OFFICER TRAINEES PAST SCORES

Test	Original Validation		Current Values (1974)			
			WOCB		OB	
	Mean	S.D.	Mean	S.D	Mean	S.D
Biographical Information	23.7	6.3	NA	NA	34.8	6.1
Self Description	71.9	8.6	81.4	6.2	NA	NA
Mechanical Principles	15.0	6.6	NA	NA	12.7	6.3
Flight Orientation	30.5	17.5	NA	NA	32.2	16.6
Instrument Comprehension	15.6	8.4	21.8	7.2	20.1	7.9
Mechanical Information	15.9	6.9	16.3	6.1	11.9	5.8
Complex Movements	28.8	8.9	26.6	9.6	27.2	12.2
Visualization of Maneuvers	15.1	7.1	20.0	5.4	19.1	6.5
Helicopter Knowledge	8.7	4.3	12.3	4.2	10.9	3.9
Stick and Rudder Orientation	22.1	9.7	29.7	6.9	26.4	8.8
Aviation Information	10.2	7.6	11.3	6.6	9.0	5.7
Mechanical Functions	12.2	7.6	18.2	6.6	15.1	7.4

Table 4

MEAN AND STANDARD DEVIATION OF FAST SCORES BY TRAINING DISPOSITON AND % ATTRITION WITHIN SAMPLE

	FAST Composite Scores			
	WOC		OFFICER	
	Successful	Eliminated	Successful	Eliminated
$\bar{X}$	342.6	333.7	278	244
SD	28.0	28.3	58.5	64.8
N	79	34	127	24
% Attrition	30.0		15.9	

Table 5

MEANS AND STANDARD DEVIATIONS OF FLIGHT TRAINING GRADES FOR SUCCESSFUL WOC AND OFFICER TRAINEES

	WOC	Officers
$\bar{X}$	82.7	85.4
SD	2.3	2.9
N	79	127

Table 6 contains the means and standard deviations of the FAST scores and final grades for all WOC and officer trainees. In this table and later analyses, eliminated trainees were assigned final grades of 68. It is apparent from Tables 5 and 6 that officers attain higher final flight training grades than WOCs. This may be attributable, in part, to the military training WOCs receive concurrently with flight and academic training.

The original validity coefficients for the FAST batteries shown in Table 7 were calculated for fixed-wing and rotary-wing composites separately. As the Army no longer has an initial entry fixed-wing program, current operational practice is to use composite scores to select Initial Entry Rotary Wing (IERW) trainees. When the current validity of the WOCB and OB composites is compared with the original validity, it appears that the predictive validity of the battery has attenuated somewhat since implementation. (Current validity coefficients have been corrected for restriction in range resulting from the FAST cutting scores.)

The two samples were divided into setback groups (students who repeat a part of the program) and nonsetback groups. Separate validity coefficients were then computed for the two groups (Table 8). The contrast between commissioned and warrant officers is striking. The WOC setbacks and nonsetbacks have essentially identical FAST scores and flight training grades. However, the validity coefficient for nonsetbacks is .58 and that for setbacks is .03. This is a highly significant difference ($Z_d = 3.30$; $p < .001$). For the officer group a quite different relationship was obtained, with setbacks demonstrating a nonsignificantly higher validity than nonsetbacks.

Table 6

MEANS AND STANDARD DEVIATIONS OF FAST SCORES AND FINAL FLIGHT TRAINING GRADES OF WOCs AND OFFICERS

	FAST Composite Scores			
	WOC		OFFICER	
	FAST-WOCB Composite Scores	Flight Training Grades	FAST-OB Composite Scores	Flight Training Grades
$\bar{X}$	339.7	78.4	273.2	82.8
SD	28.6	7.0	58.7	6.7
N	113		151	

Table 7

ORIGINAL AND CURRENT PREDICTIVE VALIDITY COEFFICIENTS
OF FLIGHT APTITUDE SELECTION TESTS

	Original Validity Estimates	Current Predictive Validity
FAST WOCB:		
Fixed Wing	.46	—
Rotary Wing	.48	.38
FAST OB:		
Fixed Wing	.39	—
Rotary Wing	.42	.44

Table 8

MEANS, STANDARD DEVIATIONS, AND VALIDITY COEFFICIENTS OF SETBACK AND NONSETBACK STUDENTS

	WOCS				OFFICERS			
	Setbacks		Nonsetbacks		Setbacks		Nonsetbacks	
	FAST	Grades	FAST	Grades	FAST	Grades	FAST	Grades
$\bar{X}$	339.7	78.1	339.9	78.6	250.2	78.1	284.2	85.1
SD	29.8	6.2	28.1	7.6	49.5	8.1	60.9	4.3
N	47		65		52		99	
r	.03		.58		.47		.35	

SUMMARY AND CONCLUSIONS

FAST scores obtained by current WOC trainees are higher than scores of trainees involved in the original validation studies (Kaplan, 1965; Rosenberg, Martinek and Anderson, 1959). The inconsistent results for the officer group suggest that this change is due to the currently higher cutting score for WOCs.

In general, officers achieve higher flight training grades than WOCs, even though the FAST OB cutting score is very low, about the 7th percentile, while the FAST WOCB has a cutting score at about the 50th percentile. Several factors which may contribute to this disparity include: (a) military training of the WOCs, (b) better academic preparation of officers, (c) a halo effect enjoyed by commissioned officers, and (d) the career consequences of failure for an officer. The validity coefficient obtained for officers indicates that a higher cutting score should reduce attrition.

The predictive validity of the WOCB has attenuated somewhat when compared with findings from the original validation studies; however, validities obtained in this study indicate that the present battery continues to be a useful selection instrument until a revision is available for operational use.

Data comparing setbacks and nonsetbacks showed marked differences between the officer and WOC samples. WOC setbacks and nonsetbacks had highly similar FAST scores and flight grades, while officers displayed the more predictable pattern of higher test scores and grades for the nonsetbacks. The lack of correlation between FAST scores and flight training grades for the WOC setbacks is difficult to interpret. Possibly the disparity in validity coefficients between these groups can be attributed to the military training required of WOCs.

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