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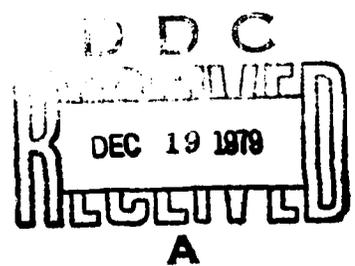
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Research Memorandum 73-1

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DEVELOPMENT OF THE NCO EVALUATION BATTERY

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(6) DEVELOPMENT OF THE NCO EVALUATION BATTERY.

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DEVELOPMENT OF THE NCO EVALUATION BATTERY

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DEVELOPMENT OF THE NCO EVALUATION BATTERY

ABSTRACT
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BACKGROUND AND PURPOSE

During Calendar Year 1972, personnel involved in PRIMARY OFFICER LEADERSHIP, OFFICER CAREER, and OFFICER INDICES Work Unit activities have cooperated with personnel of the U. S. Army Engineer School, Fort Belvoir, Virginia, in leadership assessment and development within the Engineer Officer Basic Course. School personnel requested that a similar effort be undertaken for Engineer Noncommissioned Officer Basic Courses. Specifically included within this request was the desire for development of a diagnostic Engineer NCO battery for administration to incoming students on an experimental basis, for trial use in performance counseling and training (but not for selection or other go/no-go decisions), subject to later actual follow-up validation.

ABSTRACT

The Differential Officer Battery (DOB) as Source of Content

Personnel involved in OFFICER CAREER Work Unit activities developed the NCO Evaluation Battery by selecting content from the factor-analyzed scales of the Differential Officer Battery (1, 2, 3, 4, 5, 6), primarily on the basis of their relation to OEC performance and the specific nature of item content. This work was done under Officer Career b-12, Prediction of Officer Performance in a Simulated Combat Situation. Since this effort involved adaptation of officer data to an NCO situation without full-blown research support, an empirical procedure was introduced, based on averaging of validity coefficients and use of expert judgment.

RELATING BATTERY CONTENT TO NCO COURSES

The Four Engineer NCO Basic Courses

Programs of Instructions (POIs) for the Engineer NCO Basic Courses, with their respective tracks and subtracks as appropriate and feasible, served as guides for designing outlines of NCO Evaluation Battery content to be selected. These four Noncommissioned Officer Basic Course (USAES) POIs consisted of the following:

- a. Combat Engineering (CE-CMF)
- b. Construction and Utilities (CU-CMF)
- c. Topographic and Printing (TP-CMF)
- d. Mechanical Maintenance (MM-CMF)

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General Concepts of Battery Structure

On the basis of the four Programs of Instruction identified above, preliminary generalizations about the nature of content required for the diagnostic battery were proposed. First, it appeared that there is a broad differentiation between requirements for the Combat Engineering (CE-CMF) NCO Basic Course, and those for the other three courses. It was also felt that in each of the two resulting broad domains, there are leadership requirements and specialized requirements. This formulation provided the following four target areas, with the expectation of both cognitive (information) and noncognitive (self-description) content in each, and with the fourth area to be further subdivided for the three technical area courses:

- a. Combat Engineer Leadership
- b. Combat Engineer Specialty
- c. Technical Engineer Leadership
- d. Technical Engineer Specialty

INCORPORATING OFFICER EVALUATION CENTER (OEC) RESULTS

Rated Over-all Relevance of OEC Factors

Results of factor analysis of Officer Evaluation Center data provided a further basis for guiding construction of outlines of NCO Evaluation Battery Content. Two factor analyses of OEC data yielded thirty task-specific factors and eight broad cross-task factors (7). A four-man Fort Belvoir team (LTC EN, LTC IN, CPT and NCO) used a five-step scale (zero low to 4 high) to evaluate each factor of the eight-factor and thirty-factor sets in terms of relevance to desired qualities of persons completing Engineer NCO training, with emphasis on leadership. Results averaging the judgments of the four evaluators are presented in Table 1 for the eight cross-task factors, and in Table 2 for the thirty task-specific factors. Table 2 also provides an indication of the activity category involved in each task-specific factor, as an additional guide toward selection of content for the battery. Footnotes in Tables 1 and 2 indicate those factors which were emphasized in further preparation for battery construction, as explained below.

Using OEC Validity of DOB Scales

In order to introduce the validity relationships between factor-analyzed DOB scales and OEC performance (8) to guide the selection of content for each of the four target areas identified above (General Concepts of Battery Structure), the decision was made to average the DOB scale validity coefficients in the following manner: For each of

the four target areas, the following three validity values of a given DOB scale would be averaged with equal weights (OEC criteria, chosen for relevance to the particular target area):

a. Relation to the single most relevant of the eight cross-task OEC factors evaluated in Table 1.

b. Relation to the single most relevant of the thirty task-specific OEC factors evaluated in Table 2.

c. Average relation to the most relevant group of total task scores among the fifteen OEC tasks.

In identifying relevant factors in a and b above, bipolar factors were avoided because of their ambiguity with respect to DOB scale validity, and emphasis was placed on factors considered most nearly relevant to Engineering NCO requirements. The validity data to be averaged for each of the four areas are identified in Table 3. The resulting validity averages are shown in Tables 4 and 5.

STRUCTURE OF THE NCO EVALUATION BATTERY

DOB Scales for each NCO Area

Tables 4 and 5 also indicate which DOB scales were chosen for each Engineer NCO target area identified above. In general, the intent was to assign a DOB scale to that NCO area for which it showed the highest validity (highest entry in its row of Table 4 or 5). As stated in footnotes to these tables, the goal of achieving balanced coverage of the areas led to some deviations from this procedure, and the Combat Engineer Specialty area and the Technical Engineer Leadership area were built up judgmentally with consideration of the subject matter content of the DOB scales involved. In particular, although the actual statistical results are not presented here, the Decisive Leader and Verbal/Social Leadership scales of the DOB showed favorable validity in predicting post-first-tour on-the-job performance in technical/managerial samples. Where special considerations of subject matter so indicated, some individual DOB items were shifted out of their factor-analyzed scales to cover a particular NCO area. In addition, distribution of cognitive (information) items from the Technology Operations and Technology Residual scales, and of noncognitive (self-description) items from the DI-A Manual Crafts scale, was done judgmentally among the Construction and Utilities, Topographic and Printing, and Mechanical Maintenance specialty areas. Finally, eight noncognitive items were added to measure career intention. These eight items are designed to provide a separate scale score, and are not meant to form part of any composite.

NCO Battery Scales and Composites

The NCO Evaluation Battery developed as described above consists of two instruments. The 96 information (cognitive) items constitute PT 4888, NCO Evaluation Test, NET-1A-X. The 160 self-description (non-cognitive) items constitute PT 4889, NCO Evaluation Inventory, NLI-1A-X. Their component scales are identified in Table 6. The composite scores tentatively proposed for each of the four Engineer NCO Basic Courses are shown in Table 7.

TABLE 2

THIRTY TASK-SPECIFIC OEC FACTORS: JUDGED RELEVANCE TO ENGINEER NCO BASIC COURSE (0 LOW TO 4 HIGH, FOUR RATERS AVERAGED TO .5)

	ACTIVITY CATEGORY
4.0	
III. Roadblock ^b	Combat Engr
IX. Team Direction vs. Self-Reliance (Cross-Task)	Combat Engr
XXV. Tactical Control and Consideration for Men (RB) ^a	Combat Engr
XXVI. Care of Men in Combat (RP)	Combat Inf
3.5	
VIII. Automotive Inspection ^d	Engr Tech
XVII. Command and Utilization of Men (AI) ^c	Engr Comd
XVIII. Combat Persistence vs. Technical Persistence (Cross-Task)	Combat
3.0	
IV. Reconnaissance Patrol	Combat Inf
XXIV. Mission Briefing (RP)	S-3
XXIX. Logistics Planning (SS)	S-4
2.5	
I. Security Mission	Combat
VI. Road Damage and Radiation Survey	S-2
XX. Consideration for Men (RR)	Combat Engr
2.0	
X. Observation Post	Combat Arty
XI. Site Selection	S-4
XXVII. Debriefing After IPW (RP)	S-2

Table 2 continued

1.0	ACTIVITY CATEGORY
II. Communications Exhibit	Sig Tech
XII. Supply Records	S-4
XIII. March Order	S-3
XV. Weapons Assessment	S-2
XVI. Security in IPW (RP)	Combat
XIX. Tact and Flexibility (SR)	Staff
XXI. Tactical Arrangements (MO)	S-2
XXIII. Airfield Layout	Engr Tech
0.5	
XXX. Office Management	S-1
0.0	
V. Production Analysis	S-1
VII. Computing Radiation Levels (RR)	Tech
XIV. Highway Traffic	S-4
XXII. Concise Written Reporting (PA)	S-1
XXVIII. Recording Radiation Levels (RR)	Tech

^a Criterion for Combat Engineer Leadership (Tables 3, 4, and 5).

^b Criterion for Combat Engineer Specialty (Tables 3, 4, and 5).

^c Criterion for Technical Engineer Leadership (Tables 3, 4, and 5).

^d Criterion for Technical Engineer Specialty (Tables 3, 4, and 5).

TABLE 3

OEC MEASURES PROVIDING DOB VALIDITY COEFFICIENTS TO BE AVERAGED IN GUIDING ENGINEER NCO SCALE SELECTION

NCO Area	a. Cross-Task Factor	b. Task-Specific Factor	c. Average of Total Score Validities ^a
Combat Engr Leadership	II. Combat Leadership	XXV. Tactical Ctrl and Consideration for Men (Roadblock)	Security Mission Roadblock Recon Patrol Observation Post
Combat Engr Specialty	V. Mission Persistence	III. Roadblock Mission	Weapons Assesst Rd Damage and Radn Survey March Order
Tech Engr Leadership	I. Tech/Mgrl Leadership	XVII. Cmd and Utilization of Men (Auto Inspec)	Supply Records Site Selection Hwy Traffic Plan
Tech Engr Specialty	VIII. Technical Skills	VIII. Auto Inspec Mission	Comm Exhibit Auto Inspec Airfield Layout

^a OEC Tasks Office Management and Production Analysis were not considered relevant to any of the Engineer NCO areas.

TABLE 4

AVERAGED OEC VALIDITY COEFFICIENTS OF DOB COGNITIVE SCALES CHOSEN FOR EACH ENGINEER NCO AREA

DOB Scale	Averaged OEC Validity Coefficients			
	Comb Engr Ldrshp	Comb Engr Specilty	Tech Engr Ldrshp	Tech Engr Specilty
<u>Chosen for Combat Engineer Leadership:</u> Military Tactics	.24	.16	.20	.20
<u>Chosen for Combat Engineer Specialty:</u> Practical Skills	.20	.18 ^a	.13	.35
<u>Chosen for Technical Engineer Leadership:</u> Math-Physical Science	.19	.20	.26 ^a	.35
<u>Chosen for Technical Engineer Specialty (To be Divided Among Three Specialties):</u> Technology Opns	.24	.22	.21	.45
Technology Residual	.14	.11	.13	.35
<u>Chosen for Topographic and Printing Specialty:</u> Math-Sci Residual	.13	.11	.14	.15

^a Judgmentally chosen for indicated area in order to balance coverage.

TABLE 5

AVERAGED OEC VALIDITY COEFFICIENTS OF DOB NONCOGNITIVE SCALES CHOSEN FOR EACH ENGINEER NCO AREA

DOB Scale	Averaged OEC Validity Coefficients			
	Comb Engr Ldrshp	Comb Engr Specialty	Tech Engr Ldrshp	Tech Engr Specialty
<u>Chosen for Combat</u>				
<u>Engineer Leadership:</u>				
DI-A Nature Endurance	.17	.16	.02	.15
DI-B Outdoor Skills and Combat Ldr	.26	.18	-.04	.11
DI-B Combat Engr	.23	.13	.03	.21
IUT Combat Ldr Orient	.18	.11	.03	.00
<u>Chosen for Combat</u>				
<u>Engineer Specialty:</u>				
DI-A Combat Interest	.18	.12 ^a	.02	.14
DI-A Nonaesthetic	.18	.11 ^a	.07	.08
DI-B Manual (vs. White Collar)	.25	.18 ^a	.04	.18
PDR Pract Concreteness (less Typing)	.11	.12	.05	.06
<u>Chosen for Technical</u>				
<u>Engineer Leadership:</u>				
DI-A Decisive Leader	.07	.05	.05 ^a	-.06
DI-B Verbal/Social Leadership	.13	.08	.03 ^a	-.09
IUT Scientific Orient	.10	.12	.17 ^a	.23
PDR Urban (vs. Rural)	-.05	-.01	.09	-.12
<u>Chosen for Construction</u>				
<u>and Util Specialty:</u>				
DI-A Manual Crafts (Part)	.07	.08	-.01	.30
DI-A Construction Engr	.02	.05	.02	.14
DI-B Construction Formn	b	b	b	b
PDR Manual Skill-Int	.10	.09	.03	.17
<u>Chosen for Topographic</u>				
<u>and Printing Specialty:</u>				
DI-B Scientific Int	.09	.15	.16	.25
PDR Math-Sci Skill-Int	.07	.15	.22	.27

Table 5 continued

DOB Scale	Averaged OEC Validity Coefficients			
	Comb Engr Ldrshp	Comb Engr Specilty	Tech Engr Ldrshp	Tech Engr Specilty
Chosen for Mechanical Maintenance Specialty:				
DI-A Manual Crafts (Part)	.07	.08	-.01	.30
DI-B Mechanical Interest	b	b	b	b
DI-B Diagram Interp	.11	.08	.08	.27
IUT Mechanical Orient	.11	.08	.04	.23

^a Judgmentally chosen for indicated area in order to balance coverage

^b Not computed.

TABLE 6

SCALES OF THE NCO EVALUATION BATTERY

Scale #	Code	Descriptive Title	No. of Items
<u>PT 4888, NCO Evaluation Test, NET-1A-X</u>			
1	CELC	Combat Engr Leadership Cognitive	16
2	CESC	Combat Engr Specialty Cognitive	16
3	TELC	Technical Engr Leadership Cognitive	16
4	CUSC	Const & Util Specialty Cognitive	16
5	TPSC	Topo & Printing Specialty Cognitive	16
6	MMSC	Mech Maint Specialty Cognitive	16
<u>PT 4889, NCO Evaluation Inventory, NEI-1A-X</u>			
7	CELN	Combat Engr Leadership Noncognitive	27
8	CESN	Combat Engr Specialty Noncognitive	24
9	TELN	Technical Engr Leadership Noncognitive	27
10	CUSN	Const & Util Specialty Noncognitive	24
11	TPSN	Topo & Printing Specialty Noncognitive	23
12	MMSN	Mech Maint Specialty Noncognitive	27
13	NCIN	NCO Career Intention Noncognitive	8

TABLE 7
TENTATIVE COURSE COMPOSITES OF THE NCO EVALUATION BATTERY

Scale # Code	Descriptive Title
<u>I. For Combat Engineering (CE-CMF) Course</u>	
1	CELC Combat Engr Leadership Cognitive
2	CESC Combat Engr Specialty Cognitive
7	CELN Combat Engr Leadership Noncognitive
8	CESN Combat Engr Specialty Noncognitive
<u>II. For Construction and Utilities (CU-CMF) Course</u>	
3	TELC Technical Engr Leadership Cognitive
4	CUSC Const & Util Specialty Cognitive
9	TELN Technical Engr Leadership Noncognitive
10	CUSN Const & Util Specialty Noncognitive
<u>III. For Topographic and Printing (TP-CMF) Course</u>	
3	TELC Technical Engr Leadership Cognitive
5	TPSC Topo & Printing Specialty Cognitive
9	TELN Technical Engr Leadership Noncognitive
11	TPSN Topo & Printing Specialty Noncognitive
<u>IV. For Mechanical Maintenance (MM-CMF) Course</u>	
3	TELC Technical Engr Leadership Cognitive
6	MMSC Mech Maint Specialty Cognitive
9	TELN Technical Engr Leadership Noncognitive
12	MMSN Mech Maint Specialty Noncognitive
<u>V. Single Scale for Career Intention (All Courses)</u>	
13	NCIN NCO Career Intention Noncognitive