ASVAB Validation Technical Report

Builder (BU) Rating

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14. ABSTRACT
The Armed Services Vocational Aptitude Battery (ASVAB) is used to classify recruits into Navy jobs, or ratings, using composites of test scores. Periodically these classification composites are re-evaluated to determine if they are still useful in predicting academic success for each rating. This study describes the revalidation efforts for classification into the Builder (BU) rating, including the data analyzed and the processes used to determine the most valid selection composites. Analyses showed that the largest portion of academic setbacks was due to those who had received waivers from the classification composites set in 2019, and that changing the composites in place would not be expected to change the academic setback rate while also maintaining or improving the graduation rate and also maintaining or expanded the pool of qualified accessions.

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Introduction

Future military personnel take the Armed Services Vocational Aptitude Battery (ASVAB) as part of their in-processing. This battery is usually administered at a Military Entrance Processing Station (MEPS) or Military Entrance Testing (MET) site, and includes several tests of crystallized intelligence as well as tests related to fluid intelligence (see Appendix A for brief descriptions of each test, or visit https://www.officialasvab.com). The Armed Forces Qualification Test (AFQT) is a combination of scores on four of the crystallized intelligence ASVAB tests, and is used to determine if entering the military is allowed by law (*Enlistment, Appointment, and Induction Criteria*, 2016). Combinations of other tests in the ASVAB are used to determine for which rating(s) the potential recruit is qualified.

Within the Navy there are several ASVAB composites used to determine rating qualifications (see Appendix B for a list of ratings and their current ASVAB selection composites). Scores on these composites, as well as needs of the Navy, other rating specific requirements such as minimum vision or security clearance, and Sailor interests determine into which rating the recruit will be accessed. Once the recruit completes initial military training ("boot camp"), they will attend follow-on training that is particular to their rating ("A" School, and possibly "C" School). Upon successful completion of training, they are considered part of that rating community and can be assigned to Navy billets.

Determining which composite is appropriate for which rating requires detailed analyses of training data. Prior to the 2010s, these analyses were accomplished by evaluating final school grades; those composites with highest correlation with final school grade usually became the classification composites to be used (see Held, Hezlett, Johnson, McCloy, Drasgow, and Salas (2014) for more information). In the 2010s, First-Pass Pipeline Success (FPPS) became the chosen dependent variable instead of final school grade; those with FPPS were able to successfully graduate from the training the first time without any academic setbacks. These Sailors would arrive in the Fleet the fastest with the lowest training costs, as compared to someone who had academic issues requiring a setback in training, or who failed the course and had to be reclassified to another rating while being replaced in the original rating.

Classification composites are periodically re-evaluated; changes to the training curriculum or concerns about the number of setbacks or graduates through the training may trigger a revalidation. Training data are analyzed, and options are presented to the ASVAB Validation Review Committee (AVRC), where representatives from recruiting, training, and rating health vote on what should be ultimately adopted for use as classification criteria; analyses are based on the predictions of FPPS, however decisions are made in the trade space between qualification rate, academic setback rate, and graduation rate.

In 2019, a full revalidation study was undertaken, which led to adding a 2nd possible qualifying composite. In November 2022, the scores required for qualification into BU through either composite, as well as several other ratings, were temporarily reduced. Several months later, concerns were expressed by the BU training community, predominantly about the number of academic setbacks that seemingly were caused by this reduction, so the scores were returned to their previous level in March 2024. However, as part of the discussion at that time, concerns about math knowledge were expressed and that the qualification composites in place did not

sufficiently address the math knowledge required in the rating. This report describes the recent revalidation study for the Builder (BU) rating that looked at whether qualification based on math score should be added.

Builder Work

The Navy Enlisted Manpower and Personnel Classifications and Occupational Standards (NEOCS) manuals (available at https://www.mynavyhr.navy.mil/References/NEOCS-Manual/), particularly Volume I – Navy Enlisted Occupational Standards, provide a comprehensive description of BU work at all paygrades. This detailed description is used to create training courses for the rating. This document lists the following skills and abilities for the BU rating:

Skills	**Abilities**
Critical Thinking	Information Ordering
Equipment Selection	Oral Expression
Installation	Deductive Reasoning
Management of Personnel Resources	Inductive Reasoning
Quality Control Analysis	Written Comprehension
Coordination	Problem Sensitivity
Management of Material Resources	Manual Dexterity
Operations Analysis	Spatial Orientation
Judgment and Decision Making	Selective Attention
Active Listening	Visualization

Another source of information about the BU rating, geared more toward recruiting and retention, is found online in Navy Credentialing Opportunities On-Line (COOL; https://www.cool.osd.mil/usn/). Among other rating specific pieces of information, this website includes a rating card with a short description of the rating and the associated tasks. The October 2022 card for the BU rating states:

> "Builders make up the largest segment of the Naval Construction Force. They work as carpenters, plasters, roofers, concrete finishers, masons, painters, bricklayers, and cabinet makers. This is a 5 year enlistment program.
>
> WHAT THEY DO:
> - Building and repairing wood, masonry concrete, and steel structures;
> - Installing interior finish work, including installing sheet rock, paneling or ceramic tile walls and installing ceiling and floor tile, millwork and trim;
> - Operating carpentry, cabinet-making, and tool and equipment repair shops;
> - Building forms for concrete construction;
> - Mixing, placing and finishing concrete;
> - Operating concrete batch plants, portable concrete mixers and other concrete finishing equipment and tools;
> - Building wharves, bridges and other heavy timber structures;

- Reading and interpreting blueprints and preparing sketches for projects;
- Making estimates of material, labor, and equipment requirements."

Additionally, the COOL card lists other qualifications and interests:

"For success in the builder rating, people should be oriented toward the use of tools, equipment and machines and have a high degree of manual dexterity. Knowledge of algebra and arithmetic with mixed fractions is important. Helpful qualities are a good memory, curiosity, and an ability to get along with people and the ability to express ideas orally and in writing. Also helpful is resourcefulness, the ability to keep records, do detailed work and perform repetitive tasks. Good physical condition is also necessary. Normal hearing is required."

The bulletized list of tasks from the COOL rating card is shown in Table 1, with possible ASVAB tests that might be associated with each task. While this is not a definitive list, it can be used to guide analyses. Because of the heavy use of tools in the BU rating, the Auto and Shop test in ASVAB might be associated with success in the rating. The two math tests, Arithmetic Reasoning and Math Knowledge also seem to be related to the listed tasks.

Table 1
ASVAB Linkages to the BU Rating

Tasks	**GS**	**AR**	**WK**	**PC**	**MK**	**EI**	**AS**	**MC**	**AO**	**CS**	**VE**
Building and repairing wood, masonry concrete, and steel structures	X	X			X		X	X	X		
Installing interior finish work, including installing sheet rock, paneling or ceramic tile walls and installing ceiling and floor tile, millwork and trim		X			X		X	X			
Operating carpentry, cabinet-making, and tool and equipment repair shops		X			X		X				
Building forms for concrete construction		X			X		X	X	X		
Mixing, placing and finishing concrete	X						X	X			
Operating concrete batch plants, portable concrete mixers and other concrete finishing equipment and tools							X				
Building wharves, bridges and other heavy timber structures		X			X		X		X		
Reading and interpreting blueprints and preparing sketches for projects		X			X				X		
Making estimates of material, labor, and equipment requirements		X			X						

Methods

Student Data Used

Data for the BU "A" School (CDP 6286) were analyzed for this study, as BUs could be assigned to Fleet billets without any additional training after this "A" School. The classification composite changed in September 2019 to add an additional alternative (AR+MK+AO+VE), so all data from that change to present were downloaded from Corporate Enterprise Training Activity Resource Systems (CeTARS).

The Person Event (PEVT) codes within CeTARS were used to determine key milestones during the training (see the CeTARS database for full descriptions). In addition to the enrollment code (2) and the graduation code (288), Table 2 lists all codes found in this training data, as well as whether they were categorized as an academic or non-academic setback or failure. Only academic codes were used for analyses; non-academic setbacks were not considered, and those with a non-academic failure were excluded. Those still in training were included in the data if they had already had an academic setback, as these would never have been considered an FPPS.

Table 2
Person Event Codes Used

Category	Academic Code	Non-Academic Code
Setback	48	294
	51	296
	53	297
	56	298
	324	300
	855	305
Failure	81	148
	103	229
	106	231
	309	311
		970
		971
		973

After these deletions, 974 cases remained. Table 3 provides descriptive details for each ASVAB subtest for the remaining sample. As can be seen by the minimum AFQT score in Table 3, this rating has some AFQT Category IV (scores 10-30) Sailors as allowed by policy change in late 2022 (Lawrence, 2022).

Table 3
ASVAB Test Descriptives for BU Sample

Test	Count	Min	Max	Mean
GS	973	27	74	50.93
AR	973	32	72	52.1
WK	973	25	72	50.08
PC	973	30	69	51.25
MK	973	32	71	52.92
EI	972	23	74	50.02
AS	973	21	74	48.88
MC	973	28	73	52.85
VE	973	27	70	50.54
AO	899	31	69	56.81
CS	391	23	72	55.73
AFQT	973	10	99	54.28

Classification into the BU rating utilized two possible composites, AR+AS+MC and AR+MK+AO+VE. Over the course of the time period of this data, the BU rating was included in a temporary linescore adjustment program, so the qualification scores were either 145 and 209, or 136 and 197 (respectively) when adjusted. Figures 1 and 2 provide histograms of the scores for these composites. The mean for AR+AS+MC was 153.8 and the mean for AR+MK+AO+VE was 212.2. (Note that each individual test is standardized to have a mean of 50 and standard deviation of 10 for the population; see Segall, 2004, for more details about this standardization.)

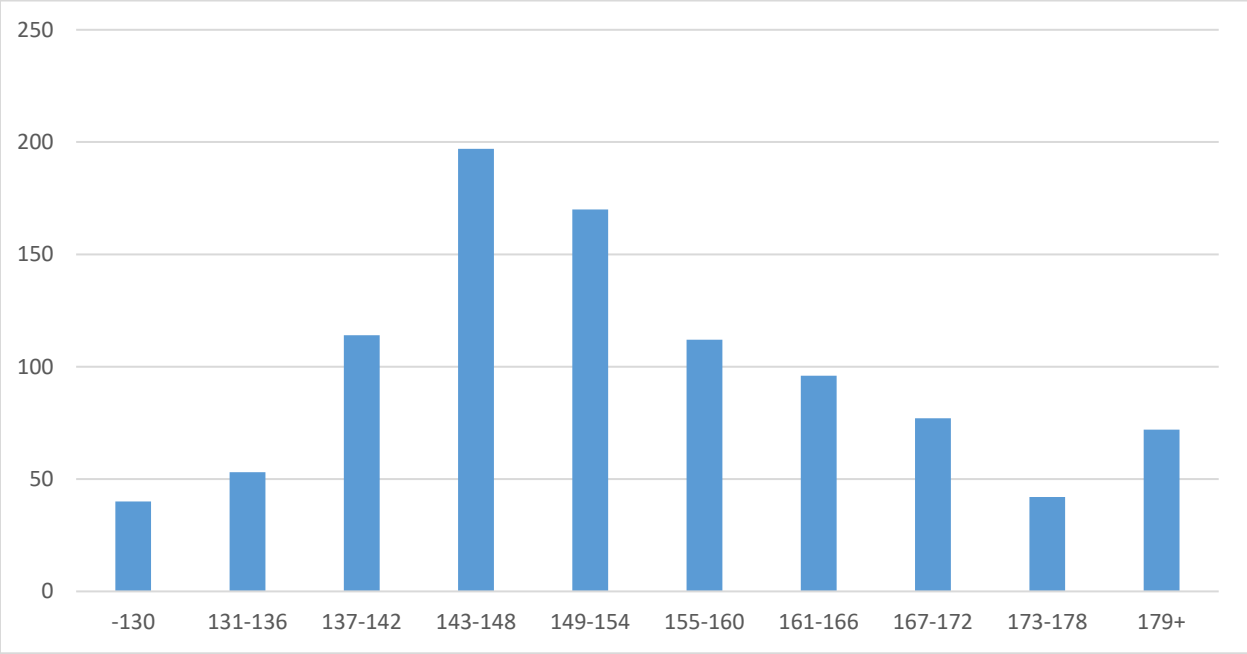


Figure 1. AR+AS+MC Scores of BU Students.

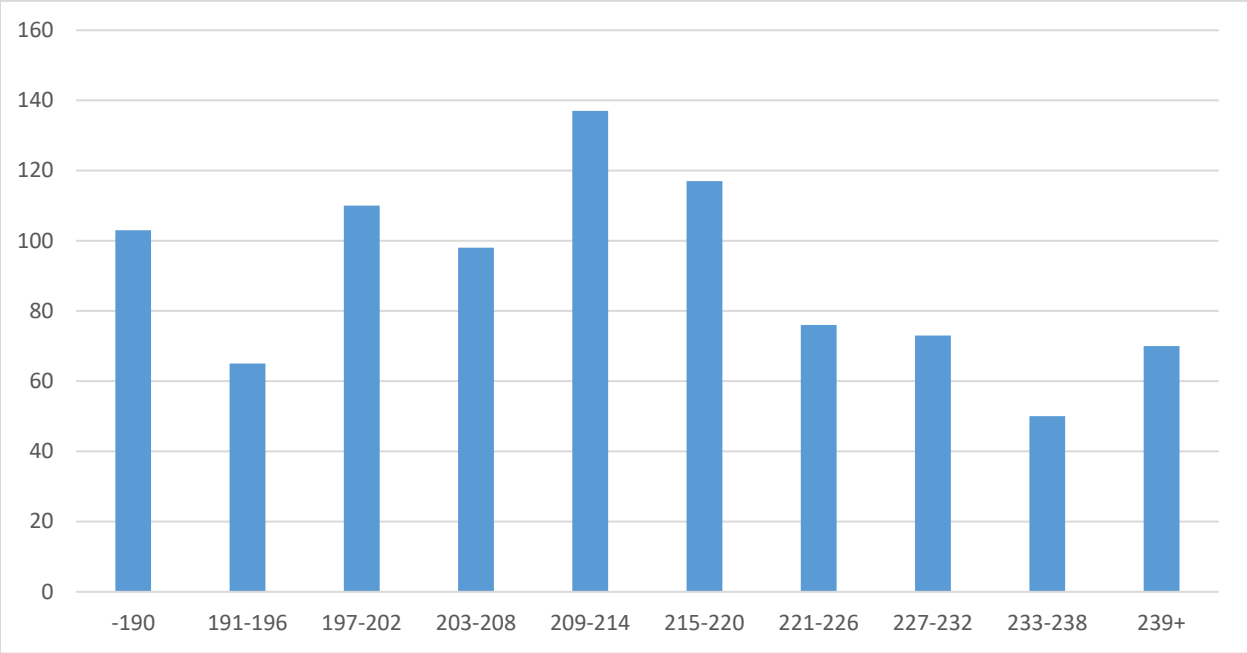


Figure 2. AR+MK+AO+VE Scores of BU Students.

While the scores were changed twice (once lowered and once returned to previous) over the period of this data, Table 4 is divided using just the higher scores. Data has been grouped based upon how each person qualified, and academic setback, graduation, and failure rates are provided for each qualification method. Those who qualified while the scores were lower are included in the total sample as well as in the last line of the table that includes all who received a waiver or qualified but under the adjusted scores; at present, policy allows waivers up to 3 points per test in a composite below what the currently approved line score is (*Class "A" School and Rating Entry Requirements*, 2016). As can be seen, the best rates of academic success are for those who qualified on both composites at the higher scores; almost all graduated and about 12% were academically set back, some multiple times as indicated by the difference between the per student and seat utilization (1 additional seat for each setback) rates. Those who qualified only on the first composite had lower graduation rates than those who qualified only on the second, but similar academic setback rates. Those who had scores lower than 145 and 209 had a graduation rate of about 87%; about half of these students had at least one academic setback, with almost 76% more seats required to accommodate the single and multiple setbacks than if they had had FPPS.

Table 4
Qualification and FPPS Rates for Each Qualification Method

	Student #	% of Sample	Academic Setback Rate (per student)	Academic Setback Rate (seat util.)	Academic Setback, Still in Training	Grad Rate	Academic Failure Rate	Observed FPPS%
Total Sample	974	100.0%	0.2628	0.3850	20	0.9487	0.0308	0.7372
Qualified Only Through AR+MC+AS>=145	274	28.1%	0.3321	0.4891	4	0.9307	0.0547	0.6679
Qualified Only Through VE+AR+MK+AO>=209	76	7.8%	0.3289	0.4474	0	0.9868	0.0132	0.6711
Qualified On Both	447	45.9%	0.1230	0.1611	3	0.9843	0.0089	0.8770
Qualified On Either	797	81.8%	0.2146	0.3011	7	0.9661	0.0251	0.7854
Waivered/Qualified under Adjusted Scores	177	18.2%	0.4802	0.7627	13	0.8701	0.0565	0.5198

When discussing initial data findings with those responsible for conducting training, the need for math came up repeatedly, with stakeholders mentioning that they have created a pre-training course that is a math refresher, as they have seen that those without strong math skills struggle through the BU training. Figures 4, 5, and 6 provide graduation and academic setback rates for those receiving various AR and MK scores (Figures 4 and 5, respectively), as well as various scores for the combination AR+MK (Figure 6).

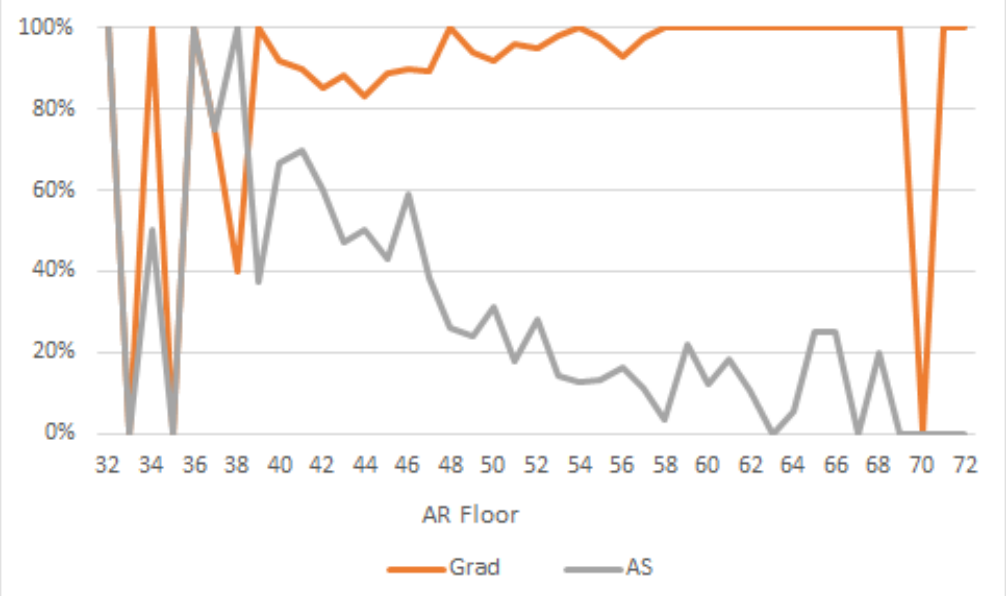


Figure 4. Graduation and Academic Setback (AS) Rates Compared to AR Scores.

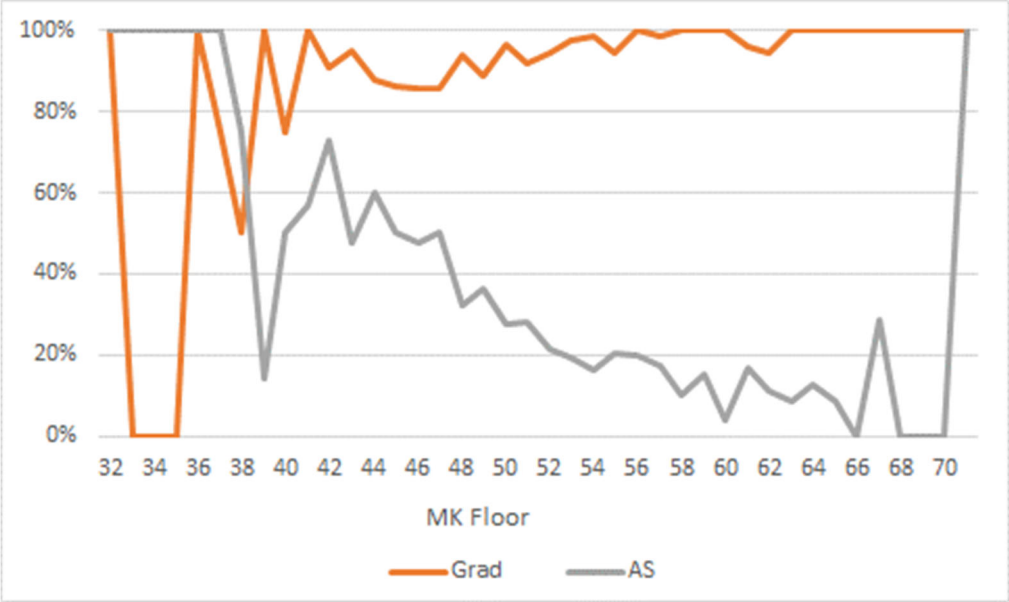


Figure 5. Graduation and Academic Setback (AS) Rates Compared to MK Scores.

Figure 6. Graduation and Academic Setback (AS) Rates Compared to AR+MK Scores.

Since only about 40% of BU students had CS data available, composites with CS were not considered in any additional analyses. Only data for the 898 BU AM students who had all test scores (excluding CS) were used to determine validity coefficients.

Validity Coefficients

Figures 7 and 8 are the receiver operating characteristic (ROC) curves for both composites. Both are classifying somewhat better than chance, as indicated by the solid line

being above the dashed chance line. The area under the curve (AUC) for figure 7 is .7008 and the AUC for figure 8 is .7267, indicating the second is slightly better at prediction than the first.

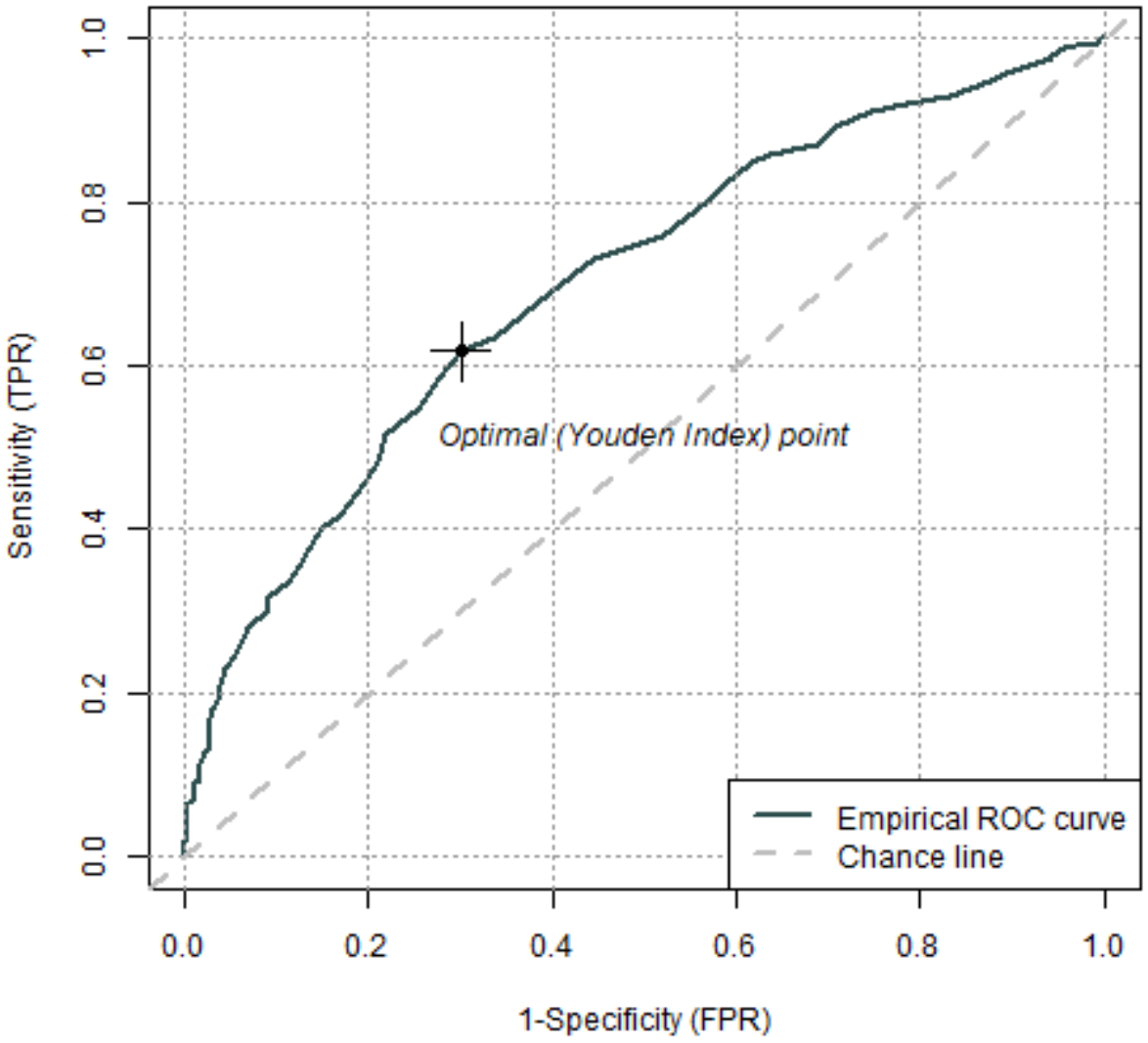


Figure 7. AR+MK+AS+VE ROC.

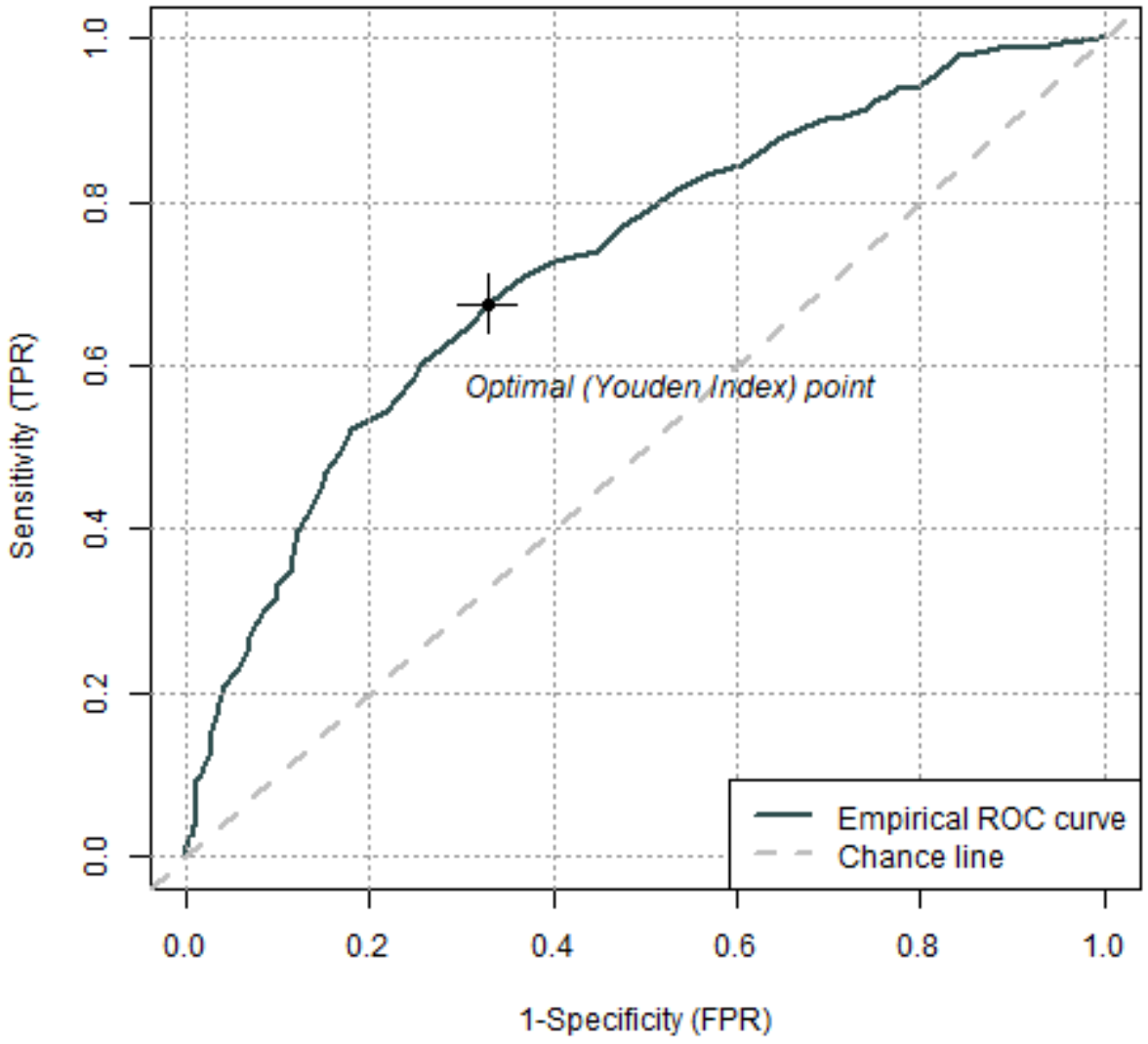


Figure 8. AR+MK+MC+VE ROC.

Correlations between FPPS and each test/composite were computed for all of the currently existing classification composites (see Appendix B). Two corrections were then applied, the first for the range restriction that occurs due to the classification process, and the second for having a dichotomous outcome variable, FPPS. For more details on both corrections, see Segall, 2004 for correcting to PAY97 norms, Held, Carretta, Hezlett, Johnson, Mendoza, Abrahams, Drasgow, McCloy, and Wolfe (2015), or Appendix C. All three correlation results are shown in Table 5, grouped by family of the test/composite. Those that are highlighted show the highest fully corrected validities, with the current composites also underlined for comparison. As can be seen, there is very little appreciable difference in validity between those with highest validity.

Table 5
Composite Validities

Composite Family	Composite	Uncorrected Validity	Validity Corrected for Range Restriction to PAY97	Validity Corrected for Range Restriction & Dichotomy (Fully Corrected)
ASVAB test	GS	0.202	0.495	0.664
ASVAB test	AR	0.325	0.567	0.762
ASVAB test	WK	0.127	0.440	0.592
ASVAB test	PC	0.211	0.502	0.675
ASVAB test	MK	0.315	0.556	0.747
ASVAB test	EI	0.163	0.415	0.558
ASVAB test	AS	0.112	0.318	0.427
ASVAB test	MC	0.245	0.475	0.638
ASVAB test	AO	0.155	0.449	0.603
ASVAB test	VE	0.169	0.492	0.661
Administrative	MK+VE	0.315	0.573	0.770
Administrative	PC+MK	0.337	0.579	0.777
Administrative	AR+PC+MK	0.368	0.598	0.803
Mechanical	AR+AS+MC	0.298	0.534	0.717
Mechanical	MK+AS+AO	0.307	0.567	0.762
Mechanical	AR+MK+AS	0.355	0.592	0.795
Mechanical	MK+AS+VE	0.293	0.573	0.770
Operations	AR+MK+AS+VE	0.345	0.594	0.798
Operations	GS+AR+2MK	0.363	0.595	0.799
Operations	AR+MK+AO+VE	0.346	0.595	0.799
Operations	AR+MK+EI+VE	0.340	0.591	0.794
Operations	GS+MK+MC+VE	0.311	0.581	0.781
Operations	MK+EI+VE	0.294	0.571	0.767
Specialized	AR+VE	0.309	0.569	0.765
Specialized	GS+MK+VE	0.296	0.569	0.765
Specialized	AR+WK	0.281	0.551	0.740
Specialized	GS+AR+MK+VE	0.340	0.589	0.791
Specialized	GS+AR+MK	0.359	0.594	0.798
Specialized	GS+MK+2VE	0.269	0.558	0.749
Technical	AR+MK+MC+VE	0.363	0.602	0.809
Technical	GS+AR+MK+EI	0.338	0.588	0.789
Technical	GS+EI+MC	0.239	0.517	0.694
Technical	GS+AR+EI+MC	0.299	0.561	0.753

Results

To determine the effect any changes to the BU classification composites would have on the larger Navy population, 12 months of recent accessions data was extracted to use as the comparison population. This included those with Active Duty Service Dates (ADSD) in the year before March 26, 2024. Males made up 75.3% of this population. In terms of race, 38.0% were White, 25.3% were Hispanic, and 25.4% were African American, with the remainder being another, unknown, or mixed race. Table 6 lists the ASVAB test descriptives for this population.

Table 6
ASVAB Test Descriptives for 12 Months of Accessions

Test	Count	Min	Max	Mean
GS	32833	20	77	50.43
AR	32831	22	77	50.73
WK	32822	20	76	50.37
PC	32832	22	77	51.20
MK	32831	26	75	52.57
EI	32800	20	80	48.58
AS	32832	20	78	45.44
MC	32826	20	80	50.07
VE	32788	20	78	50.74
AO	29701	26	70	54.99
CS	24532	22	72	61.50
CT	21373	20	78	49.87
AFQT	32800	3	99	53.04

Seven composites were evaluated to possibly use for classification into the BU rating in future. Two are the composites currently in use (AR+AS+MC and AR+MK+AO+VE) and the other five are among those with high validity (AR+MK+MC+VE, AR+PC+MK, GS+AR+2MK, AR+MK+AS+VE, and AR+MK+AS). Based on the intuitive links in Table 1, at least one composite should have a technical (AS, MC, or EI) test included and math should be included, however non-technical composites may be viable alternatives with a score that might be higher than the technical composite score. Standardized group mean score differences (Cohen's d) between majority (male or White) and minority (female or African-American/Hispanic) groups are provided for the technical composites in Table 7 and for the non-technical composites in Table 8; see the full briefing slides in Appendix D for group mean differences for the other composites with the highest validity. As can be seen in these tables, the non-technical composites have smaller differences between groups than the technical composites, with most of the technical composites having medium differences (defined as .50 to .79) and several of the non-technical composites having small differences (.20 to .49).

Table 7
Standardized Group Mean Score Differences Based on 12 Months of Accessions – Technical Composites

	AR+AS+MC	AR+MK+MC+VE	AR+MK+AS+VE	AR+MK+AS
Female-Male	-0.763	-0.306	-0.417	-0.451
African American-White	-0.956	-0.683	-0.861	-0.764
Hispanic-White	-0.679	-0.498	-0.639	-0.563

Table 8
Standardized Group Mean Score Differences Based on 12 Months of Accessions – Non-Technical Composites

	AR+MK+AO+VE	AR+PC+MK	GS+AR+2MK
Female-Male	0.011	-0.031	-0.146
African American-White	-0.607	-0.440	-0.487
Hispanic-White	-0.266	-0.333	-0.373

Predictions of FPPS and graduation rates for the accession population were computed for each of the technical and non-technical composites being considered, as well as qualification rates, and are presented in Tables 9 and 10 (technical and non-technical, respectively) across several different standardized scores. Not surprisingly, graduation and FPPS rates increase for higher scores while the qualification rates decrease.

Table 9
Predicted FPPS and Qualification Rates based on 12 Months of Accessions – Technical Composites

Standardized Score	AR+AS+MC			AR+MK+MC+VE			AR+MK+AS+VE			AR+MK+AS		
	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)
213	27.7	88.6	98.4	37.0	91.1	99.1	30.4	91.7	99.0	29.6	91.3	99.0
209	31.9	87.4	98.1	42.2	89.6	98.9	35.7	90.3	98.8	34.4	89.9	98.8
205	36.5	86.1	97.9	48.1	87.9	98.6	41.4	88.7	98.5	39.8	88.3	98.5
201	41.1	84.7	97.6	53.8	86.1	98.3	47.2	87.0	98.2	45.5	86.6	98.2
197	46.2	83.1	97.3	59.4	84.2	97.9	53.2	85.1	97.9	51.5	84.6	97.9
193	51.3	81.5	97.0	65.1	82.2	97.4	59.2	83.1	97.5	57.3	82.7	97.5
189	56.4	79.9	96.6	70.4	80.2	96.9	65.0	81.1	97.0	62.8	80.7	97.0

Table 10
Predicted FPPS and Qualification Rates based on 12 Months of Accessions – Non-Technical Composites

Standardized Score	AR+MK+AO+VE			AR+PC+MK			GS+AR+2MK		
	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)	FPPS Rate (%)	Grad Rate (%)	Qual Rate (%)
213	39.3	88.0	98.6	39.1	90.6	98.8	40.2	89.9	98.8
209	44.4	86.4	98.4	44.8	89.2	98.6	45.8	88.5	98.5
205	49.9	84.7	98.0	50.6	87.6	98.3	51.5	87.0	98.3
201	55.2	82.9	97.7	56.5	85.9	98.0	57.1	85.5	98.0
197	60.2	81.1	97.3	62.6	84.0	97.7	62.6	83.9	97.7
193	65.0	79.3	96.8	68.0	82.3	97.3	68.0	82.2	97.3
189	69.3	77.6	96.3	73.1	80.5	96.9	72.9	80.6	97.0

Several combinations of composites were considered. Because incremental change tends to be easiest to assimilate, the composite currently in use that had the highest validity and also the smallest differences between majority and minority groups for Gender and Hispanic vs White (AR+MK+AO+VE) was included in all combinations considered. The scores used for all composites considered, except for the option of maintaining the current classification combination, were adjusted such that the graduation rate of the new composite was predicted to be the same as the graduation rate for those with AR+MK+AO+VE≥209, the current score of that composite. This step might ensure that those qualifying through either composite individually would have an equal chance of "success" as suggested by the AVRC most recently: providing a fully qualified Sailor to the Fleet.

Table 11 provides combinations considered, with those with a technical composite shown first as that might be preferrable based upon the intuitive links in Table 1. The table shows the combinations considered, the qualification rate and difference from current qualification number, the ratio of the percentage qualified for three minority to majority comparisons, and the predicted graduation and FPPS rate for each combination. Because the AVRC is currently interested in at least maintaining the current graduation rate, all these combinations at minimum meet the graduation rate of the current classification standard while also attempting to increase the qualification rate.

Table 11
Summary of Qualification Standards Options Considered – Maintaining Graduation Rate

	AR+AS+MC>=145 OR AR+MK+AO+VE>=209	**(AR+AS+MC>=145 AND AR+MK>=100) OR AR+MK+AO+VE>=209**	**AR+AS+MC>=14 OR AR+MK+AO+VE>=209 OR AR+MK+MC+VE>=199**	**AR+MK+AO+VE>=204 OR AR+MK+AS+VE>=198**	**AR+MK+AO+VE>=204 OR AR+MK+AS>=149**	**AR+MK+AO+VE>=205 OR AR+PC+MK>=152**	**AR+MK+AO+VE>=205 OR GS+AR+2MK>=203**
	Current	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**
QR	59%	53%	63%	60%	60%	60%	61%
Difference from Current Qual #		-1951	1419	554	488	458	657
% Qual F::M	0.634	0.692	0.678	0.746	0.740	0.806	0.794
% Qual AA::W	0.393	0.403	0.442	0.454	0.455	0.501	0.495
% Qual H::W	0.683	0.686	0.706	0.714	0.730	0.743	0.743
Predicted Grad	98%	99%	98%	98%	98%	98%	98%
Predicted FPPS	85%	87%	85%	85%	85%	85%	85%

Option 1 adds the math floor that was suggested in conversations with SMEs. This option does slightly improve FPPS (which is heavily impacted by academic setbacks when nearly everyone is able to graduate) however this happens at the cost of the number who could potentially qualify, a possible concern in difficult recruiting times (see, for example, Stancy, 2024). The remaining options do not specifically address math (and potential academic setbacks due to lack of math knowledge) but do have math listed as part of the composite combination; all are expected to have generally similar FPPS rates when graduation rate is maintained.

Because none of these options based on higher validity and intuitive links to the workload have an appreciable impact on FPPS (while maintaining graduation rate) other than adding a math floor, additional analyses were conducted. Instead of maintaining or improving upon the graduation rate, a goal of a predicted FPPS of 90% was instead pursued, with Table 12 providing the results for these same combinations of composites. As can be seen, improving predicted FPPS rate to 90% would require large increases in associated line scores, and would also decrease the number who qualify by 10-20 percentage points. Additionally, the minority to majority qualification ratios are noticeably lower than in Table 11.

Table 12
Summary of Qualification Standards Options Considered – Increasing FPPS

	AR+AS+MC>=156 OR AR+MK+AO+VE>=224	**(AR+AS+MC>=152 AND AR+MK>=100) OR AR+MK+AO+VE>=219**	**AR+AS+MC>=155 OR AR+MK+AO+VE>=223 OR AR+MK+MC+VE>=213**	**AR+MK+AO+VE>=216 OR AR+MK+AS+VE>=210**	**AR+MK+AO+VE>=216 OR AR+MK+AS>=158**	**AR+MK+AO+VE>=217 OR AR+PC+MK>=161**	**AR+MK+AO+VE>=217 OR GS+AR+2MK>=215**
	Current	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**	**Option 6**
QR	39%	41%	44%	42%	42%	42%	43%
Difference from Current Qual #	-6629	-5664	-4969	-5489	-5451	-5440	-5201
% Qual F::M	0.458	0.552	0.519	0.609	0.607	0.694	0.691
% Qual AA::W	0.239	0.295	0.283	0.322	0.326	0.367	0.378
% Qual H::W	0.519	0.580	0.559	0.590	0.603	0.635	0.635
Predicted Grad	99%	99%	99%	99%	99%	99%	99%
Predicted FPPS	90%	90%	90%	90%	90%	90%	90%

Discussion and AVRC Decision

While Tables 11 and 12 do include predictions that are based on theory, and predictions may be overly optimistic in a real-world scenario, they do show that if academic setback is a concern, the simplest change might be to increase the scores required, and have BU trainees meet a higher standard than what is currently in place. This is shown also in the last two rows of Table 4; those who meet the higher scores have shown less academic setbacks than those who do not meet those higher scores. However, in this unusual recruiting environment, it may not be appropriate to raise scores at this moment, potentially limiting options that Navy Recruiting Command may need next year.

Another consideration, addressed in Appendix D, is math skills in the Navy generally. There have recently been several ratings that have indicated concerns about the math skills of the recruits attending training; two of these ratings (as expressed thus far) have already implemented a math course "out of hide", reteaching math skills using instructors who happen to not be teaching rating-specific training courses at that time to students who have arrived for training but whose class has not yet started. The National Assessment of Educational Progress (NAEP, available at https://nces.ed.gov/nationsreportcard/) shows that math scores of 8th graders in 2022 have approached the lows of 20 years ago. This downward trend may be due to the school shutdowns that occurred due to Covid-19, but it is unclear if there has yet been a rebound. Instituting a Navy-wide training course, at least for ratings that heavily rely on mathematics knowledge, is a potentially wide-scale solution to setbacks that are occurring because of lack of math skills.

When the AVRC met in early May 2024, some of the discussion was about those scoring below the 145 or 209 scores (the bottom row of Table 4) having the most problems in the course. Anecdotally, the Construction Battalion (CB, or Seabee) ratings are perceived as easy ratings in which to generate interest in possible recruits, and recruiting was able to make the BU recruiting mission well before the end of FY24, so the decision was to continue with the current scores and utilize fewer waivers in the recruiting process. This decision may be reconsidered at a later date and the recommended option of including a third composite, or the schoolhouse's preferred option of adding a math floor, may be implemented depending upon the success of recruiting in FY25.

References

Class "A" School and Rating Entry Requirements (MILPERSMAN 1306-618). (23 Apr 2016). Downloaded July 27, 2022 from https://www.mynavyhr.navy.mil/Portals/55/Reference/MILPERSMAN/1000/1300Assignment/1306-618.pdf?ver=4gog_6-fXVtZNdOtGr7U8g%3d%3d.

Enlistment, Appointment, and Induction Criteria, 32 CFR § 66.6 (2016). Downloaded March 1, 2023 from https://www.ecfr.gov/current/title-32/subtitle-A/chapter-I/subchapter-D/part-66/section-66.6.

Held, J. D., Carretta, T. R., Hezlett, S. A., Johnson, J. W., Mendoza, J. L., Abrahams, N. M., Drasgow, F., McCloy, R. A., & Wolfe, J. H. (2015). *Technical Guidance for Conducting ASVAB Validation/Standards Studies in the U. S. Navy* (NPRST-TR-15-2). Millington, TN: Navy Personnel Research, Studies, and Technology (NPRST).

Held, J. D., Hezlett, S. A., Johnson, J. W., McCloy, R. A., Drasgow, F., & Salas, E. (2014). *Introductory Guide for Conducting ASVAB Validation/Standards Studies in the U. S. Navy* (NPRST-TR-15-1). Millington, TN: Navy Personnel Research, Studies, and Technology (NPRST).

Lawrence, D. F. (December 5, 2022). *Navy to Accept Recruits with Lowest Test Scores as Recruiting Goal Grows*. Downloaded March 25, 2024 from https://www.military.com/daily-news/2022/12/05/navy-accept-recruits-lowest-test-scores-recruiting-goal-grows.html.

Segall, D. O. (2004). *Development and Evaluation of the 1997 ASVAB Score Scale* (Technical Report No. 2004-002). Seaside, CA: Defense Manpower Data Center.

Stancy, D. (2024). *Inside the Navy's Quest to Fix Its Recruiting Crisis*. Downloaded February 21, 2024 from https://www.navytimes.com/news/your-navy/2024/02/21/inside-the-navys-quest-to-fix-its-recruiting-crisis/ .

Appendix A
Description of the ASVAB and Additional Selection Tests

Test Type	Test Name and Abbreviation	Test Description
Standard ASVAB	General Science (GS)	Knowledge of physical and biological sciences
	Arithmetic Reasoning (AR)	Ability to solve arithmetic word problems
	Word Knowledge (WK)[a]	Ability to select the correct meaning of words presented in context and correct synonyms
	Paragraph Comprehension (PC)[a]	Ability to obtain information from written passages
	Mathematics Knowledge (MK)	Knowledge of high school mathematics principles
	Electronics Information (EI)	Knowledge of electricity and electronics
	Auto and Shop Information (AS)	Knowledge of automobile and shop technologies, tools, and practices
	Mechanical Comprehension (MC)	Knowledge of mechanical and physical principles
	Assembling Objects (AO)	Ability to determine correct spatial forms from their separate parts and connection points (not administered in all versions)
Special Tests (May be Given in Conjunction with ASVAB)	Coding Speed (CS)	Ability to quickly identify correct word/number pairings from a key with many options
	MCt	Ability to maintain value of 3 counters that increment and decrement simultaneously
	Cyber Test (CT)	Information and communications technology literacy
	Navy Advanced Placement Test (NAPT)	Knowledge of advanced physics, mathematics, and chemistry
	Defense Language Aptitude Battery (DLAB)	Aptitude to learn a foreign language

[a] WK and PC are combined to form the Verbal (VE) composite that is a component of the AFQT and several Navy ASVAB classification composites.

Appendix B
Current Composites in Use Across All Ratings

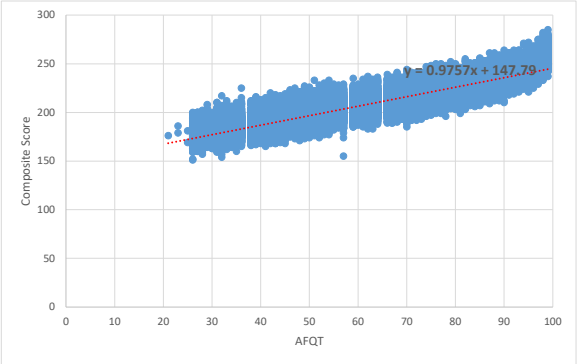
Composite Name	Composite Calculation	Rating/Program Entry Standards
Administration 1	VE+MK	CTI, LN, PS, QM, RP, YN
Administration 2	MK+CS+VE	OS, PS, RP, YN
Administration 3	PC+MK	CTR
Administration 4	AR+PC+MK	AC, CTR, HM
Cyber 1	MK+VE+CT	CWT, IT/ATF, IT/SG, ITS (ITC/ITE/ITR)
Cyber 2	AR+MK+CT	CTT/AEF, CTT/SG
Mechanical 1	AR+AS+MC	BU, CM, EO, SW
Mechanical 2	MK+AS+AO	AO, AS, BM, MR, PR
Mechanical 3	AR+MK+AS	UT
Mechanical 4	MK+AS+VE	AD
Operations 1	AR+MK+AS+VE	ABE, ABF, ABH, AIRC, AIRR, AM, AME, AN (APACT), AO, BM, DC, EN, FN (E/PACT), GSM, HT, MM, MR, PR
Operations 2	GS+AR+2MK	AECF, CWT, CTT/SG, EA, ET, FC, FCA, GM, ITS (ITC/ITE/ITR), ND, OS, SB
Operations 3	AR+MK+AO+VE	AE, AME, AT, AV, BU, EN, GSM, IC, IC/ATF, MM, MN, MT, RW, SO, STG, STG/AEF
Operations 4	MK+MC+CS+VE	SO
Operations 5	AR+MK+EI+VE	AS, CTM, IT/SG, MMA, MMS, TM
Operations 6	GS+MK+MC+VE	QM
Operations 7	MK+EI+VE	AD
Specialized 1	AR+VE	AZ, CS, EOD, LN, LS, MC, ND, RS, SB, SN (S/PACT), SO
Specialized 2	GS+MK+VE	AG, CTI, HM/ATF, IT/ATF, IT/SG, NC
Specialized 3	AR+WK	HM/ATF
Specialized 4	GS+AR+MK+VE	HM, HM/ATF, IS, IT/ATF, ITS (ITC/ITE/ITR)
Specialized 5	GS+AR+MK	AG
Specialized 6	GS+MK+2VE	HM
Specialized 7	AR+MK+MC+VE+NAPT	EM(NUC), ET(NUC), MM(NUC), NUC
Specialized 8	GS+AR+MK+EI+NAPT	EM(NUC), ET(NUC), MM(NUC), NUC
Technical 1	AR+MK+MC+VE	AC, AE, AIRC, AIRR, AM, AS, AT, AV, CSS, CWT, DC, EM, EM(NUC), ET(NUC), ETV, FT, FN (E/PACT), GSE, HT, LSS, MA, MM(NUC), MN, MR, MT, NUC, RW, SECF, STS, YNS
Technical 2	GS+AR+MK+EI	AECF, CE, CSS, CTT/AEF, EM, EM(NUC), ET, ET(NUC), ETV, FC, FCA, FT, GM, GSE, IC, IC/ATF, LSS, MM(NUC), NUC, RW, SECF, STS, STG, STG/AEF, UT, YNS
Technical 3	GS+EI+MC	EOD, ND, SO
Technical 4	GS+AR+EI+MC	MMA, MMS, TM

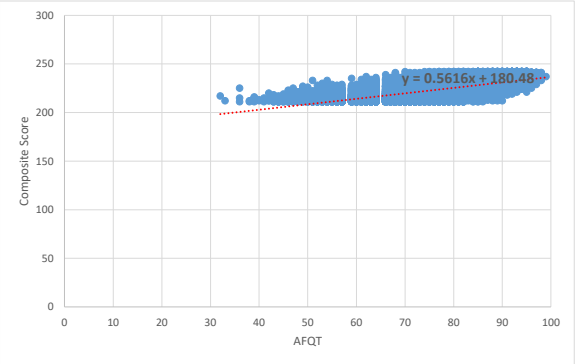
As of 5/17/2023.

Appendix C
Corrections of Validity Coefficients

Two corrections are executed before determining the fully corrected validity coefficients used to determine the best-fitting composites. The first correction is for range restriction, and the second is for dichotomy. A simplistic explanation of both is included below, with more detailed information provided in Held, Carretta, Hezlett, Johnson, Mendoza, Abrahams, Drasgow, McCloy, & Wolfe (2015).

Because a selection for the rating has already occurred prior to analyzing the training data, the validity coefficients initially computed do not cover the entire spectrum of possible ASVAB scores, as can be seen in the two graphs below with the left graph showing the complete spectrum of AFQT scores vs a composite AFQT score, and the right graph showing all AFQT but only the composite scores above a selected cutscore of 210. The correlation line equation is different between the two graphs because of the restriction in range of the graph on the right.





Matrix algebra is used to correct for this range restriction by adjusting the variance/covariance matrix of the test scores and FPPS to the PAY97 variance/covariance matrix created by Segall (2004) in the PAY97 norming process. Once each individual ASVAB score is corrected, each composite of ASVAB scores can also be corrected as laid out in Held, et al (2015).

Correcting for dichotomization accounts for the dependent variable (FPPS in this report) being a 0 or 1, which is actually a measure of an underlying continuous variable Final School Grade. The Table of Normal Deviates and Ordinates is consulted to determine the y ordinate that corresponds to the FPPS rate ("B Area in the larger portion" within the table). Each range restricted correlation is then multiplied by the calculated dichotomy correction factor $\frac{\sqrt{FPPS*(1-FPPS)}}{y-ordinate}$.

Builder (BU)

ECM Brief

Zannette A. Uriell
Navy S&C

Background

- **Navy S&C develops and monitors ASVAB standards for all Navy ratings**
  - Goal is to balance rating qualification rate and training performance
  - Ideally a revalidation occurs every 3-5 years
  - About 18 months after any change in selection standards, a retrospective is conducted to determine if change is functioning as expected

- **BU composite changed in September 2019**
  - AR+AS+MC ≥ 145 OR VE+AR+MK+AO ≥ 209

- **BU composite temporarily changed 11/23/2022**
  - AR+AS+MC ≥ 136 OR VE+AR+MK+AO ≥ 197
  - Rescinded effective 3/15/2024

- **AVRC decision to revalidate BU based on concerns about setbacks and perceived need for math floor**

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Study Goals

- **In ideal Navy, want to improve First Pass Pipeline Success (FPPS) to save money in training time and lessen aggravation due to training/reclassification of Sailors**

- **In recruiting-challenged Navy, want to maintain or improve graduation rate while increasing number who would qualify for training**
  - Use FPPS predictions to determine most valid composites (FPPS and graduation are generally related)
  - Test most valid composites and linescores to determine graduation and qualification rates
  - Consider adjustment of linescore further to account for unique recruiting environment, similar to temporary adjustments to other ratings based on rating complexity (medium) and findings of waiver analyses

About BU and Linkage to ASVAB

- Builders make up the largest segment of the Naval Construction Force. They work as carpenters, plasters, roofers, concrete finishers, masons, painters, bricklayers, and cabinet makers.– *Navy COOL, Oct 2022*

	GS	AR	WK	PC	MK	EI	AS	MC	AO	CS	VE
Building and repairing wood, masonry concrete, and steel structures	X	X			X		X	X	X		
Installing interior finish work, including installing sheet rock, paneling or ceramic tile walls and installing ceiling and floor tile, millwork and trim		X			X		X	X			
Operating carpentry, cabinet-making, and tool and equipment repair shops		X			X		X				
Building forms for concrete construction		X			X		X	X	X		
Mixing, placing and finishing concrete	X						X	X			
Operating concrete batch plants, portable concrete mixers and other concrete finishing equipment and tools							X				
Building wharves, bridges and other heavy timber structures		X			X		X		X		
Reading and interpreting blueprints and preparing sketches for projects		X			X				X		
Making estimates of material, labor, and equipment requirements		X			X						

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Findings – CDP 6286

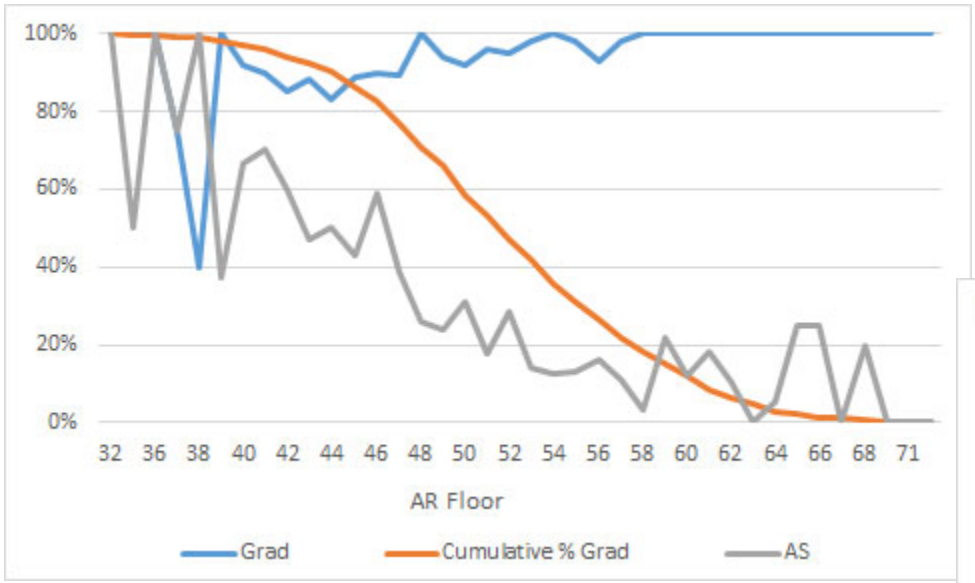
- **Below table uses the permanent scores for categorizing**
  - Those qualifying under the temporarily adjusted scores fall into the last group in this table
- **About 95% of those who attend training, regardless of being qualified or receiving a waiver, do graduate from the course**
  - Over 1 in 4 are academically set back at some point in training, 2 were setback 5 times
- **Those receiving waivers have noticeably lower grad rates (87%) and more academic setbacks**
  - 1 was setback 5 times

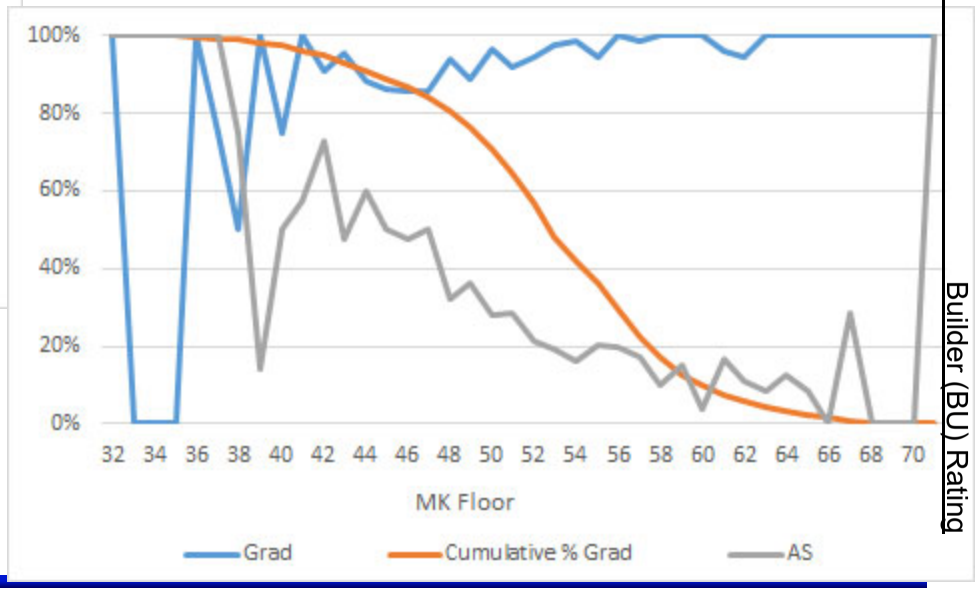
	Student #	% of Sample	Academic Setback Rate (per student)	Academic Setback Rate (seat utilization)	Academic Setback Still in Training	Grad Rate	Academic Failure Rate	Observed FPPS
Total Sample	974	100.0%	0.2628	0.3850	20	0.9487	0.0308	0.7372
Qualified Only Through AR+MC+AS>=145	274	28.1%	0.3321	0.4891	4	0.9307	0.0547	0.6679
Qualified Only Through VE+AR+MK+AO>=209	76	7.8%	0.3289	0.4474	0	0.9868	0.0132	0.6711
Qualified On Both	447	45.9%	0.1230	0.1611	3	0.9843	0.0089	0.8770
Qualified On Either	797	81.8%	0.2146	0.3011	7	0.9661	0.0251	0.7854
Waivered/Qualified under Adjusted Scores	177	18.2%	0.4802	0.7627	13	0.8701	0.0565	0.5198

Note: Data since second composite added in 2019.

AR or MK Floor

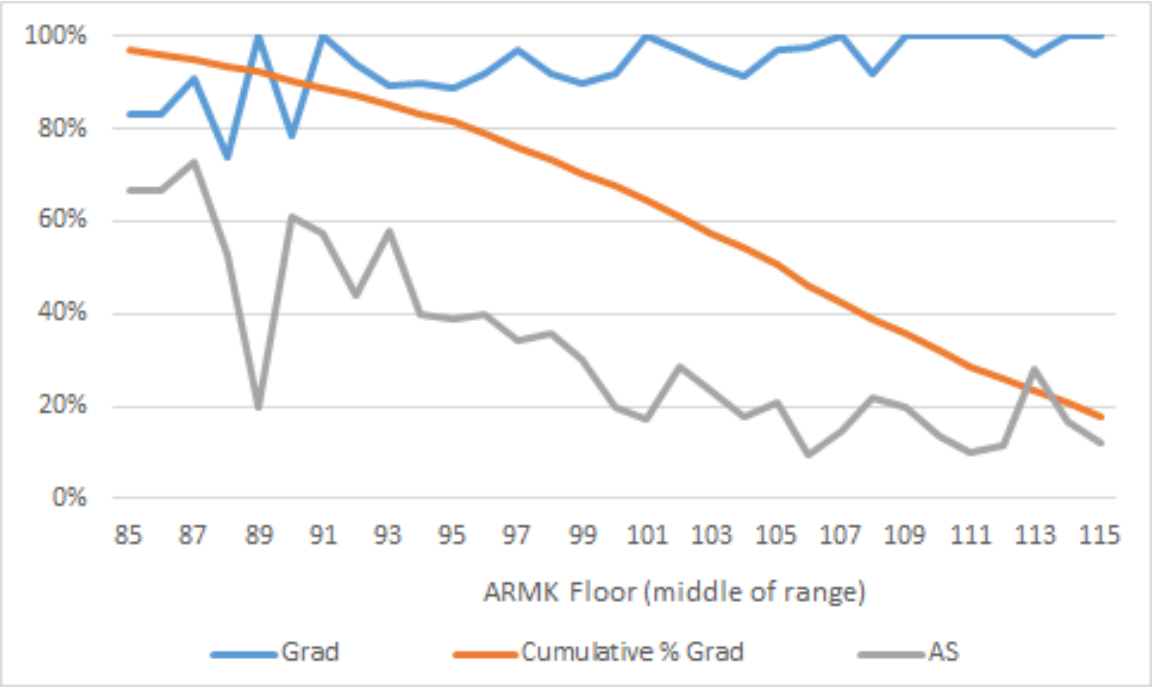
- **As the AR or MK score increases, the graduation rate increases and the academic setbacks decrease**
  - About 20% or less of those with AR or MK of 52 or higher generally have academic setbacks
  - Only about 47% of graduates have AR of 52 or higher, 57% for MK of 52 or higher





ARMK Floor

- **Combining AR and MK values (only 80% of range shown here) also shows improvement in graduation and reduction of academic setbacks as AR+MK increases**
  - A score of 104 or better reduces setbacks to about 20%
  - 54% of graduates in this data have a score of 104 or better



Fully Corrected Validity Coefficients and Diversity

- **Composites with highest validity coefficients (after corrections) listed below for comparison**

Composites	Composite (Family)	Fully Corrected Validity Coefficients n=3,142 with AO	Standardized Group Mean Score Differences: 12month Accession Population (n=32,870)		
			F-M	AA-W	H-W
AR+AS+MC	MECH1	0.717	-0.763	-0.956	-0.679
AR+MK+AO+VE	OPS3	0.799	0.011	-0.607	-0.266
AR+MK+MC+VE	TECH1	0.809	-0.306	-0.683	-0.498
AR+PC+MK	ADMIN4	0.803	-0.031	-0.440	-0.333
GS+AR+2MK	OPS2	0.799	-0.146	-0.487	-0.373
GS+AR+MK	SPEC5	0.798	-0.240	-0.569	-0.418
AR+MK+AS+VE	OPS1	0.798	-0.417	-0.861	-0.639
AR+MK+AS	MECH3	0.795	-0.451	-0.764	-0.563
AR+MK+EI+VE	OPS5	0.794	-0.363	-0.700	-0.577
GS+AR+MK+VE	SPEC4	0.791	-0.242	-0.668	-0.496
GS+AR+MK+EI	TECH2	0.789	-0.470	-0.711	-0.588

* Effect Size, or “Cohen’s d”, are terms used for measurement of group test score differences with .20 considered small, .50 moderate, and .80 large, with zero indicating no difference.

Options Under Consideration

Same or better graduation rate, with more qualifying

0. No change at present

1. Retain current and add math floor to first composite

- Small change, addresses math concern with the composite with the most validity

2. Add 3rd composite, AR+MK+MC+VE

- Increases QR through a math-heavy composite

3. Keep 2nd composite and add GS+AR+2MK

- Math included more than in current 1st composite, better validity as well

4. Keep 2nd composite and add GS+AR+MK

- Math included more than in current 1st composite, better validity as well

5. Keep 2nd composite and add AR+MK+AS+VE

- Keeps AS test, seemingly component of BU taskings

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Summary of Full Permanent Options Maintaining Graduation Rate

- **Potential modifications have minimal impact on FPPS (which includes academic setbacks) when maintaining graduation rate**
  - Adding math floor (option 1) has minimal impact on FPPS while dropping QR 6%
- **Other potential modifications might slightly increase qualification rate**

	Qualification Standard					
	AR+AS+MC>=145 OR AR+MK+AO+VE>=209	(AR+AS+MC>=145 AND AR+MK>=100) OR AR+MK+AO+VE>=209	AR+AS+MC>=145 OR AR+MK+AO+VE>=209 OR AR+MK+MC+VE>=199	AR+MK+AO+VE>=205 OR GS+AR+2MK>=203	AR+MK+AO+VE>=203 OR GS+AR+MK>=153	AR+MK+AO+VE>=204 OR AR+MK+AS+VE>=198
	[Current]	[Option 1]	[Option 2]	[Option 3]	[Option 4]	[Option 5]
QR	59%	53%	63%	61%	61%	60%
Diff from Current #		-1951	+1419	+657	+780	+554
%Qualified F::M	0.634	0.692	0.678	0.794	0.790	0.746
%Qualified AA::W	0.393	0.403	0.442	0.495	0.485	0.454
%Qualified H::W	0.683	0.686	0.706	0.743	0.745	0.714
Predicted Grad	98%	99%	98%	98%	98%	98%
Predicted FPPS	85%	87%	85%	85%	85%	85%

*12-month Navy accessions ending 3/26/24.

Summary of Full Permanent Options Improving FPPS Rate

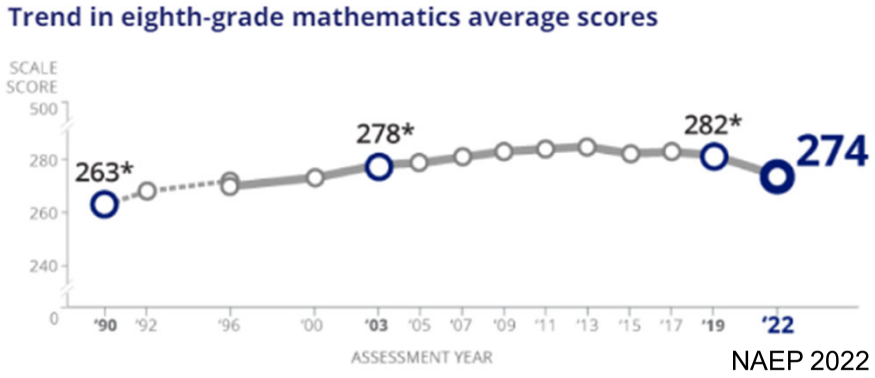
- **Considering FPPS is impacted by academic setback and graduation, improving FPPS should lead to reduced academic setback (assumes no decrease in graduation rate)**
- **Scores of previously listed composites adjusted so that FPPS is predicted to be 90%**

	Qualification Standard					
	AR+AS+MC>=156 OR AR+MK+AO+VE>=224	(AR+AS+MC>=152 AND AR+MK>=100) OR AR+MK+AO+VE>=219	AR+AS+MC>=155 OR AR+MK+AO+VE>=223 OR AR+MK+MC+VE>=213	AR+MK+AO+VE>=217 OR GS+AR+2MK>=215	AR+MK+AO+VE>=215 OR GS+AR+MK>=162	AR+MK+AO+VE>=216 OR AR+MK+AS+VE>=210
	[Current+]	[Option 1+]	[Option 2+]	[Option 3+]	[Option 4+]	[Option 5+]
QR	39%	41%	44%	43%	43%	42%
Diff from Current #	-6629	-5664	-4969	-5201	-5032	-5489
%Qualified F::M	0.458	0.552	0.519	0.691	0.678	0.609
%Qualified AA::W	0.239	0.295	0.283	0.378	0.365	0.322
%Qualified H::W	0.519	0.580	0.559	0.635	0.631	0.590
Predicted Grad	99%	99%	99%	99%	99%	99%
Predicted FPPS	90%	90%	90%	90%	90%	90%

*12-month Navy accessions ending 3/26/24.

Another Consideration: Math Training Before A-School

- **If math is related to academic setbacks, additional math training may be an option instead of adding a math floor**
- **Several ratings (MT, QM, BU) have recently commented on math issues seen in those going through training, particularly relating to academic setbacks**
- **Math scores of now-10th graders (potential recruits in 2 years) are closest to scores from 20 years ago**



NAEP 2022

- **Center for Seabees and Facilities Engineering has implemented the STAR math program**
  - Where possible for trainees, an intensive 1-week course in math (basic algebra, geometry) completed in the weeks ahead of A-school
  - Uses instructors who are not teaching that day
- **MT rating at recent R2G indicated they also are having pre-A-school math training**

Recommendation

- **Add third classification composite for BU:**

AR+AS+MC ≥ 145

OR

VE+AR+MK+AO ≥ 209

OR

AR+MK+MC+VE ≥ 199

- **Conduct full revalidation in 3-5 years**

- **Consider adding a formal math training program into the pipeline for BU and other applicable ratings**

Backup

ASVAB and Special Classification Tests

Test	Content
General Science (GS)	Biological and physical sciences
Arithmetic Reasoning (AR)	Arithmetic word problems
Word Knowledge (WK)*	Synonyms/meaning of words in context
Paragraph Comprehension (PC)*	Written passages
Mathematics Knowledge (MK)	Algebra, geometry, fractions, decimals, exponents
Electronic Information (EI)	Electrical principles and electronics
Auto and Shop Information (AS)	Automotive, tool, shop, practices
Mechanical Comprehension (MC)	Mechanical and physical principles
Assembling Objects (AO)	Patterns and connection point recognition

*VE, Verbal, is a combination of 1/3 PC and 2/3 WK

Special Classification Tests:

- Coding Speed (CS) is a perceptual speed and accuracy test.
- DLAB is the Defense Language Aptitude Battery administered to CTI candidates.
- NAPT is the Navy Advanced Placement Test administered to about 1/2 of NF candidates.
- Cyber Test (CT) is operational for some computer intensive ratings.
- Mental Counters (MCt), a working memory test, may be operational in FY23.

AFQT is a combination of PC, WK, AR, and MK; 2VE+AR+MK.

More Common PEVT Codes

Non-Academic Setback

73	STBK NACAD W/O REMEDIAL ADMINISTRATIVE LEAVE
294	STBK NACAD MEDICAL W/O REMEDIAL TRNG
295	STBK NACAD PHYSICAL W/O REMEDIAL TRNG
296	STBK NACAD MILITARY W/O REMEDIAL TRNG
298	STBK NACAD ADMIN W/O REMEDIAL TRNG
300	STBK NACAD MEDICAL W/REMEDIAL TRNG
301	STBK NACAD PHYSICAL W/REMEDIAL TRNG
302	STBK NACAD MILITARY W/REMEDIAL TRNG
305	STBK NACAD ADMINISTRATIVE W/REMEDIAL TRNG
308	STBK NACAD OTHER W/O REMEDIAL TRNG

Academic Setback

48	STBK ACAD W/O REMEDIAL TRAINING ADMINISTRATIVE
51	STBK ACAD W/REMEDIAL REVIEW BOARD
53	STBK ACAD W/REMEDIAL CLSRM LACK OF COMPREHENSION
56	STBK ACAD W/REMEDIAL TRNG MOTIVATION LACK OF PERF
324	STBK ACAD W/REMEDIAL TRAINING LAB INABILITY
855	STBK ACAD W/REMEDIAL TRAINING

Non-Academic Failure

148	NON-GRAD NACAD ADMIN UNSUITABILITY
149	NON-GRAD NACAD ADMIN HARDSHIP
207	NON-GRAD NACADDEATHNON-TRAININGRELATED
211	NON-GRAD NACAD PHYSICAL NOT AQUATICALLY ADAPTABLE
212	NON-GRAD NACAD PHYSICAL PRTFAILURE
214	NON-GRAD NACAD PHYSICAL PERFORMANCEFAILURE
227	NON-GRAD DSNRL CLASS/COURSECANCEL
228	NON-GRADDSNRL ADMINRATING/PROGCONV
229	NON-GRAD DSNRLADMIN RECALLEDBY PARENTACTIVITY
230	NON-GRAD DSNRLADMIN NONPREREQ MED/PHY
231	NON-GRAD DSNRL ADMIN NONPREREQACADEMIC
232	NON-GRAD DSNRL ADMIN NONPREREQ SECURITY
311	NON-GRAD NACAD OTHER
320	NON-GRAD NACAD MOTIV NEGATIVE MILITARY ATTITUDE
970	NON-GRAD NACAD MEDICAL
971	NON-GRAD NACAD LEGAL - UCMJ ACTION
972	NON-GRAD NACAD LEGAL - CIVIL ACTION
973	NON-GRAD NACAD LEGAL - ADMIN ACTION
986	NON-GRAD NACAD MEDICAL 986
987	NON-GRAD NACAD LEGAL 987
994	NON-GRAD NACAD MEDICAL 994

Academic Failure

81	NON-GRAD ACAD CLSRM LACK OF CMPRHN/RETENTION
103	NON-GRAD ACAD LABORATORY LACK OF MANUAL SKILLS
106	NON-GRAD ACAD LABORATORY LACK OF KNOWLEDGE APPL
135	NON-GRAD NACAD MOTIV EXPRESSED DOR
138	NON-GRAD NACAD MOTIV LACK OF PERF SCOL N/O CHOICE
141	NON-GRAD NACAD MOTIV LACK OF PERF SCOL N/W EXPCTD
142	NON-GRAD NACAD MOTIV LACK OF PERF NEG TRNG ATT
309	NON-GRAD ACAD OTHER

(NOTE: Historically PEVT 135, 138, and 141, categorized as motivational attrition, are considered academic failures for ASVAB validation analyses as these students are judged to be unable keep up in the course.)

Findings Table – Key Points

- **Findings, or decomposition, table will show how many qualified through each possible qualification method and various success rates for each**
- **Non-academic failures are removed from all analyses; non-academic setbacks are not considered since a change of ASVAB would not impact these (see separate list for what is considered non-academic failure)**
- **Those with an academic setback but not yet done with training included in FPPS analyses, so graduation rate + academic failure rate may not total to 100%**

More data is better for basing decisions, recommend never less than 100 total

This can show if one composite is driving the data

- Per student setback closer to 0 is better– rate= % / 100
- Seat utilization accounts for if multiple setbacks occurred (taking multiple seats per person); closer to per student rate means closer to 1 setback per person

Grad closer to 1 is better - rate= % / 100

First Pass Pipeline Success – 100% is better

	Student #	% of Sample	Academic Setback Rate (per student)	Academic Setback Rate (seat utilization)	Academic Setback Still in Training	Grad Rate	Academic Failure Rate	Observed FPPS%
Total Sample	218	100%	.1835	.2057	5	.9343	.0657	80.73%
Qualified Only Through VE+AR+MK+AS≥210	4	1.8%	0	0	0	1.000	0	100.00%
Qualified Only Through MK+AS+AO≥152	135	61.9%	.2370	.2570	3	.9394	.0606	75.56%
Qualified On Both	54	24.8%	.0556	.0556	1	.9623	.0377	92.59%
Qualified On Either	193	88.5%	.1813	.2302	4	.9471	.0529	80.83%
Waivered	25	11.5%	.2000	.2000	1	.8333	.1667	80.00%

Top line is all data being considered

Next set of lines is per individual composite as well as combination

Last set of lines is qualified (sum of the previous set) vs waivered

Validity Chart Overview

- **Chart shows multiple things – most valid composites (29 currently in use), what "family" composite is in (6 possible), what the corrected validation coefficient of the data is, and demographic comparisons of the mean scores/dispersion for each composite**

Composites	Composite (Family)	Fully Corrected Validity Coefficients n=214 with AO	Standardized Group Mean Score Differences: 12month Accession Population (n=38,308)		
			F-M	AA-W	H-W
VE+AR+MK+AS	OPS1	.667	-0.652	-1.096	-0.644
MK+AS+AO	MECH2	.598	-0.549	-1.079	-0.514
VE+AR+MK+EI	OPS5	.662	-0.594	-0.961	-0.592
VE+AR+MK+MC	TECH1	.656	-0.556	-1.006	-0.585
GS+AR+MK+EI	TECH2	.655	-0.637	-1.018	-0.612
AR+MK+AS	MECH3	.654	-0.649	-1.058	-0.577
PC+AR+MK	ADMIN4	.651	-0.338	-0.753	-0.436
MK+AS+VE	MECH4	.649	-0.680	-1.130	-0.700
GS+AR+MK+VE	SPEC4	.647	-0.489	-0.934	-0.576
VE+AR	SPEC1	.645	-0.495	-0.894	-0.548
MK+EI+VE	OPS7	.644	-0.602	-0.947	-0.627

Validity Chart - Composites

- **Usually top 10 with highest validity are shown in descending order, with those currently in use underlined and at the top**
- **Coefficients closer to 1 are better; there is a greater level of prediction as the two things (in this case, composite score and FPPS) are closely related (.7 or higher is considered a very strong relationship)**

Composites	Composite (Family)	Fully Corrected Validity Coefficients n=214 with AO
VE+AR+MK+AS	OPS1	.667
MK+AS+AO	MECH2	.598
VE+AR+MK+EI	OPS5	.662
VE+AR+MK+MC	TECH1	.656
GS+AR+MK+EI	TECH2	.655
AR+MK+AS	MECH3	.654
PC+AR+MK	ADMIN4	.651
MK+AS+VE	MECH4	.649
GS+AR+MK+VE	SPEC4	.647
VE+AR	SPEC1	.645
MK+EI+VE	OPS7	.644

- 6 families, roughly based on ratings that utilize the composite (Administration, Cyber, Mechanical, Operations, Specialized, Technical)
- Composites currently in use (listed at top) may not be highly correlated, but may still provide usefulness in qualification decision (e.g., AO is a test of fluid intelligence and minority groups may score higher than they would on crystallized intelligence tests)
- Very little difference (meaningless) between a validity of .645 and .644; .598 and .644 nearly similar

Validity Chart – Group Differences

- **3 right columns compare minority and majority (females compared to males, African Americans compared to Whites, Hispanics compared to Whites) using Cohen's d, which looks at the size of the difference between the means and how dispersed the data is around the means**

- Negative numbers show that the first listed (minority group for this chart) is lower than the majority group
- Absolute value closer to 0 would be very little difference between the 2 groups
  - .2 or less is considered small effect size
  - .5 is considered medium effect size
  - .8 is considered large effect size
- If correlations are similar, select composite with lower effect size (may not be lower for all 3 comparisons)

Composites	Standardized Group Mean Score Differences: 12month Accession Population (n=38,308)		
	F-M	AA-W	H-W
VE+AR+MK+AS	-0.652	-1.096	-0.644
MK+AS+AO	-0.549	-1.079	-0.514
VE+AR+MK+EI	-0.594	-0.961	-0.592
VE+AR+MK+MC	-0.556	-1.006	-0.585
GS+AR+MK+EI	-0.637	-1.018	-0.612
AR+MK+AS	-0.649	-1.058	-0.577
PC+AR+MK	-0.338	-0.753	-0.436
MK+AS+VE	-0.680	-1.130	-0.700
GS+AR+MK+VE	-0.489	-0.934	-0.576
VE+AR	-0.495	-0.894	-0.548
MK+EI+VE	-0.602	-0.947	-0.627

Options Chart Overview

- **Chart shows current composite combination compared to several others deemed the best of those considered during analyses**
- **Many issues considered when determining combinations to consider, including correlation with FPPS, graduation and FPPS rate, qualification rate, current composite (incremental changes), and demographic subgroup comparisons**

	Qualification Standard			
	VE+AR+MK+AS ≥ 210 or MK+AS+AO ≥ 152	**VE+AR+MK+AS ≥ 199 or VE+AR+MK+EI ≥ 199 or VE+AR+MK+MC ≥ 199**	**VE+AR+MK+AS ≥ 187 or VE+AR+MK+EI ≥ 187 or VE+AR+MK+MC ≥ 187**	**VE+AR+MK+AS ≥ 204 or VE+AR+MK+EI ≥ 204 or VE+AR+MK+MC ≥ 204**
	[Current]	[Option 5 – Waiver match current FPPS]	[Option 6 – Match current FPPS]	[Option 7 – Match current QR]
QR	66.4%	75.3%	92.4%	67.3%
Diff from Current #	---	+3,443	+9,990	+357
%Qualified F::M	.699	.745	.903	.683
%Qualified AA::W	.504	.606	.836	.520
%Qualified H::W	.632	.803	.943	.752
Predicted Grad Rate	95.3%	95.6%	94.6%	96.0%
Predicted FPPS	85.9%	90.9%	86.2%	92.6%

Options Chart - Interpretation

- **Chart applies findings from those who went through A-school (data in use) to a larger group, either recent Navy accessions or applicants (i.e., what would last year have looked like if these standards had been in place at the start)**

	Qualification Standard			
	VE+AR+MK+AS ≥ 210 or MK+AS+AO ≥ 152	VE+AR+MK+AS ≥ 199 or VE+AR+MK+EI ≥ 199 or VE+AR+MK+MC ≥ 199	VE+AR+MK+AS ≥ 187 or VE+AR+MK+EI ≥ 187 or VE+AR+MK+MC ≥ 187	VE+AR+MK+AS ≥ 204 or VE+AR+MK+EI ≥ 204 or VE+AR+MK+MC ≥ 204
	[Current]	[Option 1]	[Option 2]	[Option 3]
QR	66.4%	75.3%	92.4%	67.3%
Diff from Current #	---	+3,443	+9,990	+357
%Qualified F::M	.699	.745	.903	.683
%Qualified AA::W	.504	.606	.836	.520
%Qualified H::W	.632	.803	.943	.752
Predicted Grad Rate	95.3%	95.6%	94.6%	96.0%
Predicted FPPS	85.9%	90.9%	86.2%	92.6%

Options may have different cutscores from current, as several cutscores may have been evaluated to meet desired criteria

Change in number qualified compared to current

Ratio of qualification rates for various demographic subgroups; a ratio closer to 1 shows the qualification rates to be similar

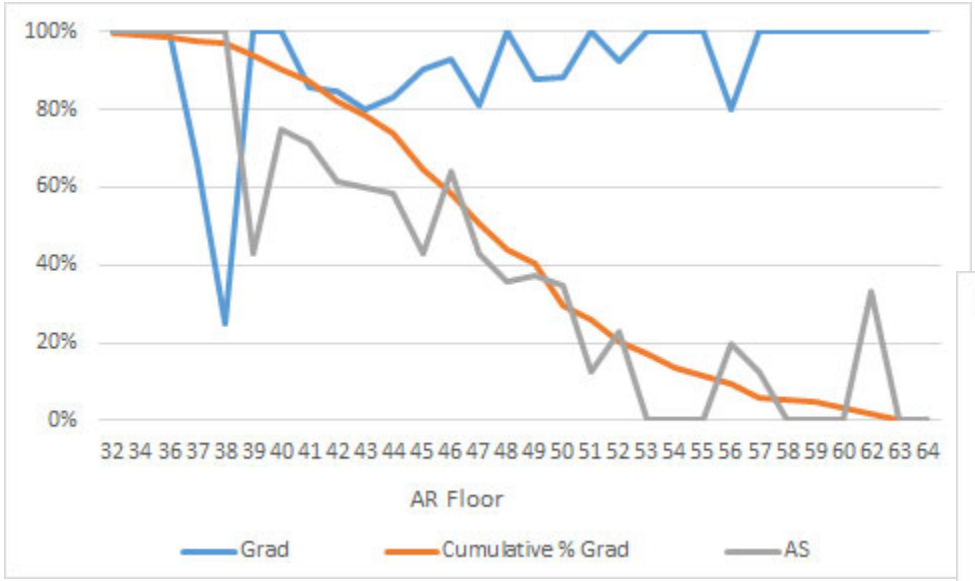
If H and W were same size groups, roughly 6 H qualify for every 10 W

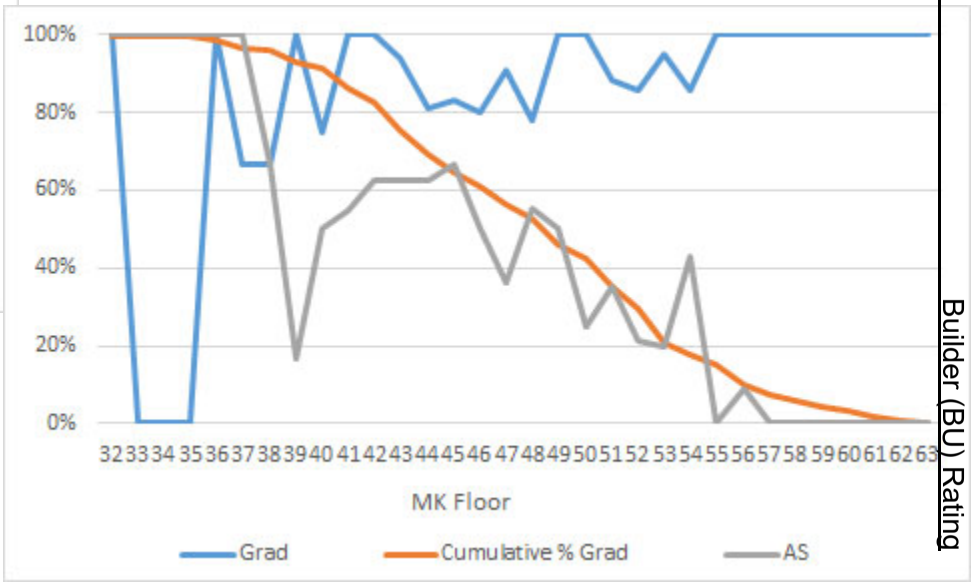
Predictions, assuming next year consistent with previous year; may not actually be observed in future

Predicted graduation rates lower than predicted FPPS due to setbacks; if setbacks less of a concern, can base comparison between options solely on graduation rate

AR or MK Floor (Only Qualifying on 1st Composite)

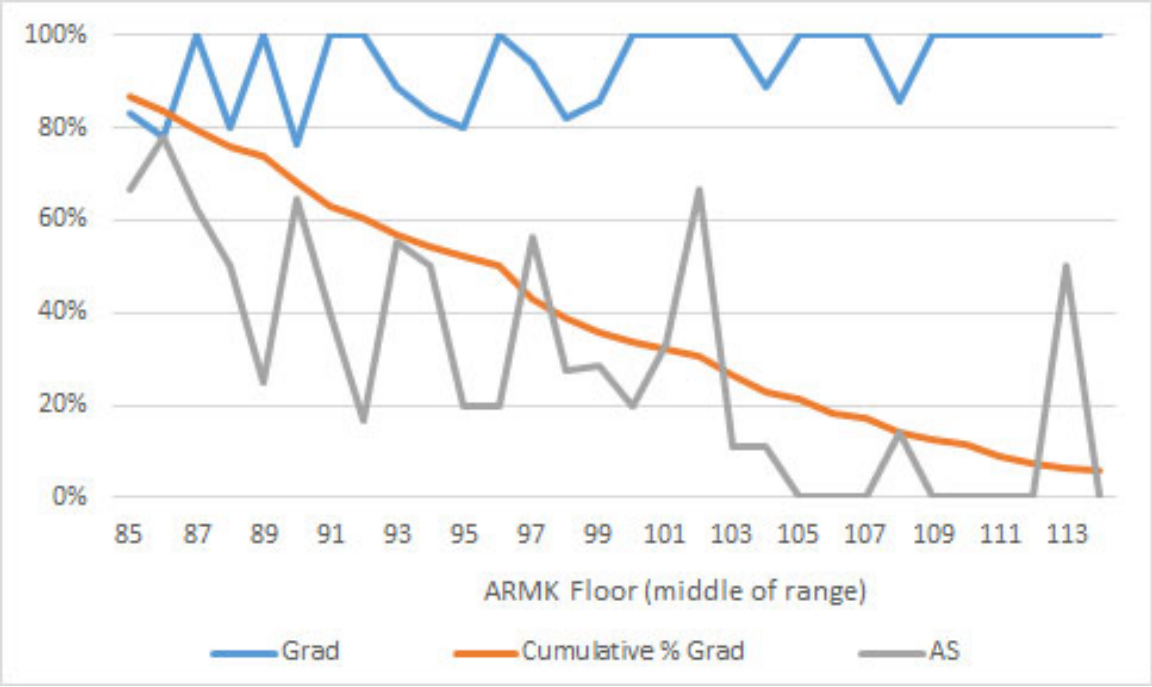
- **For those who only qualify because of AR+MC+AS, course success increases as the AR or MK score increases**
  - About 20% or less of those with AR of 52 or higher generally have academic setbacks
  - Only about 20% of graduates have AR of 52 or higher, 30% for MK of 52 or higher





ARMK Floor (Only Qualifying on 1st Composite)

- **Combining AR and MK values (only 82% of range shown here) also shows improvement in graduation and reduction of academic setbacks as AR+MK increases**
  - A score of 103 or better reduces setbacks to about 20% or less
  - Only 26% of graduates in this data who qualified only on the 1st composite have a score of 103 or better



Supplemental Training Academic Resource (STAR)

- **The STAR program consists of a three day a week class, revolving around teaching basic math(basic algebra, construction mathematics, and geometry). This class starts with a Pre-Test to gauge student understanding followed by a Post-Test to gauge improvement. The course repeats weekly, but after one week the students have been taught the information to succeed in the basic mathematical practices of the "A" school. Students Pre/Post Test Grades are tracked to show improvement in the program.**
  - To date, 105 Students have attended the full course and taking both tests. 163 total students have attended the course with or without taking both tests to show the improvement.
  - The average Pre-Test Score is 53%, with only 15/105 students passing.
  - The average Post-Test Score is 81% with 91/105 students passing.
  - Out of 163 students who attended STAR, 157 students graduated Builder (BU) "A" School.
  - The 6 Attrites who attended STAR scored no higher than 68% on their STAR tests. Of these 6, three attended the full STAR course.

Note: Provided by Center for Seabees and Facilities Engineering N7