



**DEFENSE ADVISORY COMMITTEE
ON MILITARY PERSONNEL
TESTING**

**December 19, 2023
Meeting**



**Office of the Under Secretary of Defense
(Personnel and Readiness)**

Minutes approved for public release.

Nancy J. Tippins

March 18, 2024

Dr. Nancy Tippins, Chair, DACMPT

DATE

**DEFENSE ADVISORY COMMITTEE
ON
MILITARY PERSONNEL TESTING**

December 19, 2023

A Fiscal Year (FY) 2023 special session of the Defense Advisory Committee on Military Personnel Testing (DACMPT) was held on December 19, 2023. The meeting was conducted virtually using the Microsoft® Teams online collaboration tool. Dr. Sofiya Velgach (Assistant Director, Office of Accession Policy [AP]) opened the meeting by stating that it was being held under the provisions of the Federal Advisory Committee Act (FACA) of 1972 (5 USC, Appendix, as amended), the government in the Sunshine Act of 1976 (5 USC, 552b, as amended), and all other governing Federal statutes and regulations, and open to the public. She said the 2-hour meeting would focus on the use of calculators on the Armed Services Vocational Aptitude Battery (ASVAB), the agenda was available on the DACMPT website¹, and public comments would be received at the end of the meeting.

Dr. Velgach thanked the committee members for their participation and noted the absence of Dr. Won-Chan Lee. She then introduced the Director of AP, Dr. Katherine Helland, and Mr. Leonard Litton, Principal Director for Military Personnel Policy (MPP). Addressing the administrative components of the virtual meeting, Dr. Velgach asked attendees to enter their name, organization, and email address into the Teams chat feature to provide a complete record of attendance. She also informed participants that the meeting was *not* being recorded on the Microsoft Teams® system. She instructed all Teams participants to mute their devices and to click the “raise hand” button when they wanted to speak.

The attendee list and agenda are provided in **Tab A** and **Tab B**, respectively. **Tab C** contains a list of acronyms. The Committee Chair has provided a letter, written by the committee members, summarizing key committee findings and recommendations. The letter is included in these minutes at **Tab D**.

1. Calculator Use on the ASVAB (Tab E)

Dr. Matthew Trippe, Supervisory Personnel Psychologist, Defense Testing and Assessment Center (DTAC), presented the briefing.

Dr. Trippe began with the objectives of the presentation, which were to (a) describe the current policy on the use of calculators, (b) communicate expressed concerns with the current policy, (c) describe the background and potential impacts of immediate implementation of calculator use, (d) describe the path forward and current status, (e) relay Military Accession Policy Working Group (MAPWG) member input, and (f) obtain advice from the DACMPT.

Dr. Trippe described the current policy with respect to calculator use on the ASVAB. Foremost, the ASVAB test-taking policy does not permit use of calculators. Accordingly, test questions on the sub-tests Arithmetic Reasoning (AR) and Mathematical Knowledge (MK) are designed to be answered without the use of a calculator. Content developers assume mental or manual calculation when including numeric

¹ The DACMPT website Meetings page is located at <https://dacmpt.com/meetings/>.

values, operations, variables, and equations in test items, which limits the complexity of required calculations.

Dr. Trippe then described previous research, Calculator Use and the ASVAB Study (Buckland et al., 2021). The study surveyed subject matter experts (SMEs) regarding the importance of math skills for success in training and on the job, and the necessity of doing math without a calculator. Given evidence that math without a calculator is needed in training and on the job, the study recommended maintaining a policy of not allowing calculators during ASVAB testing. Dr. Trippe showed a table indicating the frequency of various calculator conditions (no math required, always have a tool, basic math without a calculator, algebra/geometry without a calculator, higher order math without a calculator) across initial training programs and jobs.

Dr. Trippe then relayed concerns over the current calculator policy:

- Other national testing programs (e.g., American College Testing Test [ACT], Scholastic Aptitude Test [SAT], General Educational Development test [GED]) allow calculators on the quantitative tests.
- Exclusion of calculators may result in the perception that the Office of the Secretary of Defense (OSD) testing program is not keeping up with trends in assessment.
- High school curriculum often allows calculators during instruction and exams.
- Test items requiring manual calculations may result in increased test anxiety, as students are not accustomed to performing such calculations.
- The Chief of Army has requested immediate implementation of calculators for ASVAB administration.

Dr. Trippe provided information about the background of the ASVAB, describing how the ASVAB is a large-scale, high-stakes assessment used for three primary purposes: (1) personnel selection – to determine if an applicant is qualified to enlist based on the Armed Forces Qualification Test (AFQT), which is a composite of AR, MK, Paragraph Comprehension (PC), and Word Knowledge (WK) scores; (2) classification – to assign applicants to jobs in the military using Service-specific aptitude area composites; and (3) career exploration – to facilitate career exploration for high school and early post-secondary students via ASVAB Career Exploration Program (CEP) composite scores.

Next Dr. Trippe communicated concerns about the immediate implementation of calculators, which included: (a) impact(s) on validity that might affect decades of validity evidence being based on ASVAB administration without the use of calculators, and thousands of AR and MK items having been developed under the assumption of manual calculation conditions; (b) unknown psychometric impacts on difficulty, dimensionality, response time, fairness, norms, and composite cut scores; (c) score utility in respect to interpretability and loss of score utility without a clear score meaning; and (d) statutory compliance. Under statutory compliance, Dr. Trippe explained that USC, Title 10, Sec 520, mandates how AFQT is to be applied for the purpose of enlistment. Specifically, the statute mandates a limitation on enlistment of applicants with an AFQT score between 10 and 30. This implies an ability to accurately estimate aptitude. Immediate implementation of calculators for operational use on the ASVAB will result in changing the definition of the AFQT scores in unknown ways without substantiating science. This would present difficulty in faithfully complying with direction in the statute.

Turning to the path forward, Dr. Trippe explained that AP and DTAC have recommended and received funding to execute a two-phased approach to incorporating the use of calculators into the accession testing program. Phase 1 is a pilot analysis of ~2.5 years. It includes four initial steps and three contingent steps.

- Step A. Identify “calculator sensitive” items.
- Step B. Collect and analyze data (pilot administration and analysis) for research purposes.
- Step C. Provide results to DACMPT members for scientific review and advice.
- Step D. Develop recommendation for moving forward based on pilot analysis results and DACMPT advice.

Steps E, F, and G are contingent on pilot analysis results indicating the presence of dimensionality and other substantive measurement issues associated with calculator use.

- Step E. Conduct equating study with current MK & AR tests.
- Step F. Develop policy updates and guidance.
- Step G. Implement operational software updates.

Phase 2 is the development of new test(s) and may extend over a period of ~5 years. It includes an initial step and three contingent steps.

- Step A. Conduct needs/requirements assessment.
- Step B. Develop test(s).
- Step C. Develop software.
- Step D. Collect data and conduct validation analyses.

It is important to note that Phases 1 and 2 can be initiated simultaneously.

Dr. Trippe then briefed the committee on the current status of the effort. In Phase 1A (identify calculator sensitive items) DTAC has provided HumRRO with ~200 MK and ~200 AR items for SME review of calculator sensitivity. The effort is currently underway as of November 2023. In Phase 1B (pilot administration and analysis) DTAC is administering linear (non-adaptive) MK and AR forms at Military Entrance Processing Stations (MEPS), randomly assigning applicants to calculator-permitted or not-permitted conditions, collecting identifying information to link to operational ASVAB records, administering a post-assessment questionnaire, targeting analysis sample size of 1,500 per condition or 3,000 total, and collecting data beginning in December 2023 and running for approximately 90 days. Phase 2A (conducting a needs/requirements assessment) is planned to run concurrent with Phases 1A and 1B.

Dr. Trippe provided more detail on Phase 1B, the pilot analysis. He explained that the research questions to be answered in this study include: (a) Does allowing calculators differentially impact examinee performance (e.g., scores, response time) on AR, MK, and the Armed Forces Qualification Test (AFQT)? (b) Is this impact comparable across groups? (c) Does allowing calculators differentially impact item characteristics (e.g., IRT parameters, classical item statistics)? (d) Does allowing calculators impact test dimensionality?

Regarding Phase 2A, needs/requirements analysis, Dr. Trippe clarified the purpose is to determine whether it is appropriate to develop new MK, AR, or special purpose tests that incorporate calculators. This requires (a) reviewing findings from previous research, including Calculator Use and the ASVAB (Buckland et al., 2021) and the ASVAB Training Relevance Survey (Adams, et al., 2022), and (b) collecting training and technical job requirements data from Services to define the job taxonomy, define the constructs to be measured, and inform item types and test specifications. Dr. Trippe then presented a chart summarizing the Phase 1 and 2 timelines from Year 1 to Year 5.

Dr. Trippe recapped the October 10, 2023, MAPWG meeting that focused on calculator use on the ASVAB. An AP representative informed the MAPWG of the Army's request for immediate operational implementation of calculators and summarized interwoven legal and scientific risks. MAPWG representatives from the Navy, Marine Corps, Air Force, Space Force, and Coast Guard all concurred with the statutory and scientific risks associated with the absence of evidence on the potential impact. The Marine Corps representative hypothesized that if only the Army allows use of calculators, more applicants may be drawn to the Army if they perceive an easier route to accession in the zero-sum recruiting context. All MAPWG Service representatives, except for the Army, are not in favor of immediate operational implementation of calculators on the ASVAB without substantiating science.

The briefing concluded with Dr. Trippe directly asking the DACMPT for input and advice on the situation and proposed study.

At the end of the briefing, Dr. Velgach said there is support at the Services' Vice Chief level to proceed with calculator use across Services. The Army, in particular, is interested in arriving at this end point and is driving the request for immediate implementation.

A committee member asked for clarification on the primary problem to be solved. That is, is it to meet recruiting goals more easily by increasing applicant scores through calculator use? Dr. Velgach explained that senior leadership wants to increase the number of applicants by removing deterrents to testing and improving testing conditions. She noted that other standardized tests allow calculator use, and leadership is concerned that students may be deterred from taking the ASVAB because they know they cannot use a calculator, and even those who decide to take the test may experience higher levels of stress during testing due to the unavailability of a calculator. The committee member responded by saying that States require math testing to graduate, and at least one state includes two sections of math – one calculator and one not. Thus, it is important to think about what type of math should be on a test based on calculator availability. S/he also mentioned that the calculators required for the state exams are not just basic function calculators but include graphing functions. S/he cited a TI-84 as an example. Another committee member said that, even with a calculator, a person still has to know how to use it. S/he said she did not think having a calculator would benefit those taking the ASVAB.

Dr. Trippe provided clarification on the proposed device. The device being considered is much simpler than the TI-84, being just a “four-function-plus” calculator. He said it was selected because it avoids complexities associated with its use and matches ASVAB content. He said there are no items on which a graphing calculator would be helpful. A committee member asked if DTAC had looked at the relationship between skills required to do the ASVAB math with and without a calculator; that is, are they correlated? S/he suggested the skill sets are likely somewhat different, with one potentially involving accuracy of input and reading the output and the other (no calculator) thinking through the calculations. S/he said, however, the more important factor is what the jobs require. Do they allow math to be done on calculators or require hand- or mental-calculations? Dr. Trippe said that was a great question, restated the importance of potential dimensionality, and commented briefly on the needs analysis he had mentioned earlier. He said the needs analysis was intended to answer the question, what is needed on the job? He said DTAC queried recruiters, one of which described how he used a calculator when performing the calculations required to set up a landing pad for a helicopter. Dr. Velgach added that the needs analysis was also intended to inform whether it might be useful to have a special test on which calculators are allowed in addition to one where calculators are not allowed.

Another committee member commented that the discussion had already covered much of what s/he wanted to say. S/he thanked Dr. Trippe for presenting the research and said it was well organized and useful for understanding the issues and the potential downstream effects of changes. S/he added that the concept of dimensionality brought to mind individual differences and construct relevance, both of which s/he said are important. That is, does a calculator change the way one thinks about doing math? S/he said this is an opportunity to understand jobs better (through job analysis) and to rethink measurement. S/he said there are issues with scaling, which are unsettling, particularly when content is anchored to standards. S/he asked how calculator use might affect classification and suggested thinking about the minimal required competence, suggesting use of the Angoff method. The committee member concluded by recommending that

any job analysis should include determining where and how different types of math are used in different jobs.

2. Calculators on the ASVAB (Tab F)

Mr. Ethan Blankenship, Director of Army Accessions/Retention Policy, Office of the Deputy Assistant Secretary of the Army (Military Personnel), Manpower & Reserve Affairs (M&RA), presented the briefing.

Mr. Ethan Blankenship began his briefing by thanking Dr. Trippe for his presentation and the committee members for their input. He said the OSD carries responsibility for the reliability and validity of the ASVAB, and he was thankful the DACMPT members were able to provide input. Regarding the request for calculator use, he said senior leadership was interested and wanted to make the request. He also noted that they do not want to “rush to failure.” He said the Chief has acknowledged the risks but, after receiving guidance, the Army is prepared to assume those risks. He mentioned the Future Soldier Preparatory Course as a means of mitigating risk by improving scores for those who attend the training.

Mr. Blankenship addressed three points: ASVAB modernization, the Army’s request, and risk mitigation. Regarding modernization, the Army fully supports the research efforts and subsequent prudent work being done by the collective effort of DTAC and AP. The Army also understands the potential need to re-norm tests due to the introduction of calculator use and looks forward to supporting the chosen methodologies. A recent trend of moving away from standardized tests has emerged, but science, technology, engineering, and mathematics (STEM) intensive universities (e.g., Massachusetts Institute of Technology, Georgia Tech, and Georgetown University) have reverted to historical trends with the use of these tests.

Regarding the Army’s request, Mr. Blankenship said a recent session of the MAPWG addressed the topic of calculator use, and the immediate use of calculators on the ASVAB was not supported by other Services. The Army believes the environment, as compared to when the ASVAB was created, has changed and the non-use of a calculator may impair the ability to gain a true understanding of an applicant’s suitability for service. He said calculators are a key portion of mathematics instruction and assessment of student proficiency in most secondary schools. This request is service-neutral and is not intended for use only by the Army.

Mr. Blankenship concluded by addressing risks and mitigation. The Army acknowledges that there is potential risk involved with this request, to include effects on test validity, ongoing studies, and force readiness. The Army is prepared to assume these risks with mitigations through Service-sponsored initiatives, including the Future Soldier Preparatory Course-Academic Skills Development Program.

At the end of the briefing, Dr. Velgach noted the Army is supportive of the methodology being proposed, but that it wants to begin implementation immediately and assume the risks. She asked the committee for their thoughts on that approach.

A committee member asked for clarification: The Army will allow for calculator use and use scores for the AR and MK tests as though they were taken without a calculator? Mr. Blankenship said that was the intent. The committee member then asked how the Army would address concerns that the tests may be measuring different skills and abilities. Mr. Blankenship said the Army’s senior leaders have considered that question. He said they would like to see what happens but are supportive of DTAC’s plan. He said the Army could assume the risks of immediate implementation. The committee member asked what other types of data the Army would collect to evaluate the approach. Mr. Blankenship said, if approved, it can include training completion as well as less proximal data. He said they are prepared to start looking at those

metrics and are interested in seeing the results. The committee member stressed the importance of defining outcome metrics from the outset. S/he said “how they perform” is too general and more specificity is required to avoid bias in measurement (i.e., relying on observations of people who may be influenced by personal opinion). S/he said it is important to be specific and then collect identified data for systematic analysis. Mr. Blankenship agreed, saying they would want measures of success associated with training as well as job performance; that is, deeper than whether the applicant fully contracts. The committee member stressed the importance of examining job performance due to the allowance of calculators in training. Mr. Blankenship agreed and commented on his observation that initial training and job performance are two different worlds.

Another committee member asked if it would be possible to return to the status quo once calculators are introduced by policy change, even in the case that the new condition identified additional performance dimensions or subgroup differences. Mr. Blankenship said the Army, hypothetically, could return to the prior policy, but would have to decide what to do with the problem cohorts. He added that the Army is “fully supportive of the full proposal;” that is, to examine the situation in the long term. He concluded by saying the use of calculators aligns with the transformation in who the Army wants to recruit and potentially provides an opportunity to open the aperture for more applicants.

Dr. Velgach commented that it would be problematic for one Service to proceed with calculator use while the others did not. She also said allowing use, and then later disallowing it, would raise serious concerns about the meaning and utility of the scores. She said the proposed research design incorporates a pilot that will provide the opportunity to understand the meaning of the scores while not using the scores for operational decision making. She said AP believes the DTAC recommended methodology is answering the Army’s concern regarding the reduction of stress and test deterrence while still ensuring any scores used for operational decision making are well understood.

A committee member said the Army appears to want to move quickly and is willing to take the risk. S/he asked if there was some way to expedite or compress DTAC’s work, such that some basic conclusions could be drawn more quickly than they would in the current plan. Dr. Velgach said AP and DTAC have been thinking about this. Dr. Trippe explained that his interpretation of the flowchart is, if there is little or no impact, then the policy change can be made fairly quickly. The data will drive the appropriate steps for the solution. He added, however, that he would not expect that to be the outcome. He said he would predict differences in performance but not in dimensionality. He said DTAC has an infrastructure set up to conduct the study quickly, but that if the results show a new test is required, then that would be a major undertaking. He said the options are not mutually exclusive; it might be possible to make some adjustments quickly and others later. However, Dr. Trippe said DTAC could not commit to this.

Dr. Pommerich said DTAC has been thinking about this for a long time and the proposed plan *is* the fast track. She said she did not see any way to further expedite the process. She described how an earlier formulated approach was a 10-year effort and that the current approach is the condensed version. She said the most positive outcome would be the absence of dimensionality, which is what they want to see. Dr. Velgach explained that conducting the two phases

concurrently accelerates the process. She said she believes the analysis will drive them to an optimal solution. Mr. Blankenship said the Army is appreciative of the efforts made to bring the timeline to where it stands now.

Returning to the Army's desire to implement calculators operationally immediately, Dr. Pommerich said she did not see how that approach and the study could be implemented at the same time. Mr. Blankenship recalled the Army's question as being whether it could implement policy change now while the study is being performed. Dr. Pommerich said she wanted to hear the committee's perspective on the situation.

Mentioning the timeline shown on slide 13 of Dr. Trippe's presentation, a committee member asked, at what point would the Army's risk be minimal while still allowing maximal recruiting benefit? That is, what boxes need to be checked before operational implementation? S/he asked if the equating study needed to be done before there would be very little risk or is there a time – perhaps 6 months from now – when the dimensionality question would be answered. Dr. Trippe said data collection will be completed by March 2024, at which time DTAC will be able to answer the dimensionality and performance questions. He said they could not collect sufficient data for an equating study by March and an equating study would require additional data collection and analyses. He mentioned other issues, including logistics for purchasing and maintaining the calculators and impact on the ASVAB CEP. Dr. Velgach said those were good points and clarified that the full 5-year timeframe is needed in the case that a new test must be developed.

A committee member suggested the possibility of delaying implementation for a few months (i.e., for completion of the basic analyses) before making the decision. Dr. Velgach said AP agrees: conduct the analyses and then let the results drive the if/then decisions. Another committee member noted how the Future Soldier Preparatory Course led to increased ASVAB scores, even without calculator use, suggesting this as an alternative. Dr. Velgach explained the course is only for low aptitude individuals and not designed to be conducted on a wider basis. She said allowing calculators would be applied across the board, not just to increase scores, but to avoid losing applicants who might not otherwise apply. Mr. Blankenship concurred.

A committee member agreed that AP should let the data speak, noting that the current study should not be viewed as a 5-year plan but a 3-4 month check-in to see what initial analyses reveal about the near-term impact now, as well as the paths that are open for future exploration and action. Another committee member reiterated the fact that data would be available soon. S/he said unforeseen problems arise when an organization makes decisions like this. Even in such cases, it is difficult to pull things back. S/he reported being on the cautious side when the stakes are really high, as they are in this case. S/he stated the importance of each Service having accurate predictors. Another committee member agreed that the decision should be data-driven.

A committee member reinforced the conclusions of the other committee members, saying it will be interesting to see how the situation plays out, especially due to the clear intersections between process and politics, as occurs when implementing impactful decisions in any large organization. S/he said there will be operational surprises as well as other surprises and reinforced the need to take a conservative approach solely for the purpose of ensuring the process is conducted

correctly. S/he said calculator use will come with risks; that is, scores may increase for some or all, or they may not increase at all. Dr. Velgach raised the need to understand the impact across the range of scores as well as across groups. She mentioned potentially varying levels of familiarity with calculators. Another committee member agreed that calculator use may accentuate subgroup differences and suggested some modest training on calculators may be necessary for some.

A committee member agreed that the current data collection effort is needed but asked what else would be needed if no dimensionality is discovered. Dr. Trippe, citing slide 10, explained that data collection started a week ago and they are anticipating 3,000 participants by March. He said they would then clean, process, and analyze the data. Having results by the next DACMPT meeting maybe difficult, but they could discuss a draft sensitivity report prepared by HumRRO. He suggested another special session may be needed. The committee member asked if the absence of dimensionality would be sufficient for operational implementation? S/he then asked how much of the analyses on slide 13 would need to be performed before the policy could be changed? Dr. Trippe said they should have the data required to answer the dimensionality and subgroup difference questions by March. He said when the pilot analyses (those conducted as part of Phase 1b) are completed, they would provide the data needed to decide the path. The committee member asked what DTAC would need to see in order to decide, to which Dr. Trippe replied, information on differential impact on examinee performance and dimensionality. He said these analyses would take some time to complete and that the data were *not* the correct set of data required for equating. Dr. Pommerich reiterated her desire to be conservative.

A committee member asked what kind of precedent would be set by implementing the policy for one Service but not for the other Services. S/he noted the ASVAB's standardized use across Services and asked if changing that would diminish the value of the test or restrict its usage in the future. That is, how important is it that all Services stay aligned on this policy? Dr. Velgach emphasized the appropriateness of that concern, but said the Army is looking at the impact across Services and wants to understand the perspectives of every Service. She said the decision, whatever it is, will be implemented across Services. A committee member asked if the pilot study was only an Army initiative and might pose a threat to program integrity. Dr. Velgach replied that the study is designed to collect data for all Services. Mr. Blankenship clarified that the Army was just bringing the initiative forward. He said that they were not trying to communicate a message of "come join the Army, you can use a calculator." He stressed the importance of standardization across Services, something he said the Marine Corps had emphasized.

Dr. Pommerich reiterated that the MAPWG representatives were all in favor of executing the research plan instead of immediately allowing the operational use of calculators. She also restated the threat posed by immediate use: they will not know what the scores mean. A committee member thanked Dr. Pommerich for bringing the discussion back to the meaning of scores. S/he said, though the decision to delay implementation has implications for near-term recruiting outcomes, at the end of the day, knowing that the test measures the knowledge and skills required by the jobs is the main objective of testing. Dr. Velgach concurred, explaining that the proportion of those accessed with an AFQT score between 10 – 30 is part of Title 10, and for that reason alone AP must maintain a clear understanding of what the scores mean.

Wrapping up the discussion, Dr. Velgach summarized the committee's perspective as concurring with DTAC's plan to have the pilot data drive the next set of decisions. She said the overall process may not have to take 5 years, but they must conduct the appropriate analyses.

3. Public Comments

Dr. Velgach opened the floor for public comments, of which there were none. She then thanked the committee members and stated that the discussion had clarified implications of various decisions and emphasized the need to maintain valid, reliable, and fair assessments that place individuals in a position to be successful.

Tab A

LIST OF ATTENDEES

Defense Advisory Committee on Military Personnel Testing (DACMPT) August 16-17, 2023

<u>Name</u>	<u>Position</u>	<u>Organization</u>
Dr. Nancy Tippins	Owner and Manager	DACMPT (Chair), Nancy Tippins Group, LLC
Dr. Sonia Esquivel	Professor	DACMPT, US Air Force Academy
Dr. Osvaldo Morera	Professor	DACMPT, University of Texas El Paso
Dr. Fred Oswald	Professor	DACMPT, Rice University
Dr. April Zenisky	Associate Professor	DACMPT, University of Massachusetts, Amherst
Dr. Sofiya Velgach	Designated Federal Officer (attendance req'd by FACA)	Office of Accession Policy (AP)
Dr. Katherine Helland	Director	AP
Mr. Leonard Litton	Principal Director for Military Personnel Policy (MPP)	Office of Secretary of Defense, MPP
Dr. Ashlea Klahr	Acting Director	Office of People Analytics (OPA)
Mr. Christopher Graves	Principal Scientist	Human Resources Research Organization (HumRRO)
Ms. Sachi Phillips	Project Manager	HumRRO
Dr. Mary Pommerich	Director	Defense Testing and Assessment Center (DTAC)
Dr. Matthew Trippe	Supervisory Personnel Psychologist	DTAC
Dr. Ping Yin	Personnel Research Psychologist	DTAC
Dr. Steven Holtzman	Personnel Research Psychologist	DTAC
Dr. Temeka Franklin	Personnel Research Psychologist	DTAC
Dr. Tom Waterbury	Personnel Research Psychologist	DTAC
Dr. Mihn Duong	Personnel Research Psychologist	DTAC

Dr. Tia Fechter	Supervisory Personnel Research Psychologist	DTAC
Dr. Irina Rader	ASVAB CEP National Director	DTAC
LTC Charles Manning	US Military Entrance Processing Command (USMEPCOM) Liaison Officer	AP
Dr. Jennifer Tucker	Assessment Branch Chief	US Space Force
Mr. James Bryan		US Coast Guard Recruiting Command
SGM Alan Myers	Senior Retention & Accessions Policy Manager	US Army HQDA, G1
Mr. Ethan Blankenship	Director of Army Accessions/ Retention Policy	Office of the Deputy Assistant Secretary of the Army, Manpower & Reserve Affairs (M&RA)
Dr. Tonia Heffner	Chief, Selection and Assignment Research Unit	US Army Research Institute (ARI)
Dr. Cristina Kirkendall	Research Psychologist	ARI
Dr. Amanda Mouton	Personnel Research Psychologist	US Air Force
Mr. Ken Schwartz	Chief, Testing and Survey Policy	Air Force Personnel Policy
Dr. Bobbie Dirr	Personnel Research Psychologist	US Air Force Personnel Center
Mr. Andrew Dereglia	Personnel Research Psychologist	US Air Force Personnel Center
Mr. Benjamin Gilbert	Personnel Research Psychologist	US Air Force Personnel Center
Mr. James Johnson	Director, Selection and Classification	US Navy, Office of the Chief of Naval Operations (OPNAV) N132
Dr. Jason Jacobs-Lentz	Acting Director	US Navy, OPNAV N132
Dr. Jennifer Tucker	Assessment Branch Chief	US Space Force
Mr. Brad Tiegs	Testing Director	US Military Entrance Processing Command (USMEPCOM)
Mr. David Davis	Chief, Testing Division	USMEPCOM
Mr. Jaime Clayton	Enlistment Testing Program Manager	USMEPCOM

Dr. Scott Oppler	Chief Scientist	HumRRO
Dr. Claire Vincent	Program Manager	HumRRO
Dr. Deirdre Knapp	Chief Scientist	HumRRO
Dr. Kimberly Adams	Program Manager	HumRRO
Dr. Monica Gribben	Principal Scientist	HumRRO
Dr. Jeff Dahlke	Senior Scientist	HumRRO
Dr. Olga Golovkina	Senior Scientist	HumRRO
Dr. Andrea Sinclair	Program Manager	HumRRO
Dr. Kevin Bradley	Principal Scientist	HumRRO
Dr. Tim McGonigle	Division Director	HumRRO
Mr. Tom Blanco	Vice President	S&T Consulting and Program Management
Mr. Peter Yeager	Executive Director	Educational Testing Service
Mr. Leon Buck		

Tab B

AGENDA

Defense Advisory Committee on Military Personnel Testing (DACMPT) December 19, 2023

August 16, 2023 (Central Time)

1:00 p.m. – 1:05 p.m.	Welcome and Opening Remarks	Dr. Sofiya Velgach (OASD(M&RA)/AP)
1:05 p.m. – 2:00 p.m.	Calculators on the ASVAB	Dr. David M. Trippe OPA/DTAC
2:00 p.m. – 2:45 p.m.	Immediate Implementation of Calculators	Mr. Ethan Blankenship ASA(M&RA)
2:45 p.m. – 2:55 p.m.	<i>Public Comments</i>	
2:55 p.m. – 3:00 p.m.	Closing Comments	Dr. Nancy Tippins Chair

ABBREVIATIONS KEY:

ASVAB - Armed Services Vocational Aptitude Battery

ASA (M&RA) – Office of the Assistant Secretary of the Army for Manpower and Reserve Affairs

OASD (M&RA)/AP - Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs/Accession Policy

OPA/DTAC - Office of People Analytics/Defense Testing and Assessment Center

Tab C

LIST OF ACRONYMS

ACT	American College Testing Test
AFQT	Armed Forces Qualification Test
AP	Accession Policy
AR	Arithmetic Reasoning
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ASVAB	Armed Services Vocational Aptitude Battery
CEP	Career Exploration Program
DACMPT	Defense Advisory Committee on Military Personnel Testing
DTAC	Defense Testing and Assessment Center
FACA	Federal Advisory Committee Act
FY	Fiscal Year
GED	General Educational Diploma
HumRRO	Human Resources Research Organization
IRT	Item Response Theory
MAPWG	Military Accession Policy Working Group
MEPS	Military Entrance Processing Stations
MK	Mathematics Knowledge
MOS	Military Occupational Specialty
M&RA	Manpower & Reserve Affairs
OPA	Office of People Analytics
PC	Paragraph Comprehension
SAT	Scholastic Aptitude Test
SME	Subject Matter Expert
STEM	Science, Technology, Engineering, and Mathematics
USC	U. S. Code
USMEPCOM	U.S. Military Entrance Processing Command
WK	Word Knowledge

Tab D

Katherine Helland, Ph.D.
Director, Accession Policy
Accession Policy
Room 3D1066
4000 Defense Pentagon Washington
DC 20301-4000

Dear Dr. Helland,

The Defense Advisory Committee on Personnel Testing (DACMPT) is pleased to provide this report on our two-hour meeting December 19, 2023, which was held virtually. The purpose of the meeting was to discuss the use of calculators when taking the Armed Services Vocational Aptitude Battery (ASVAB). We found the presentations by Dr. David M Trippe and Mr. Ethan Blankenship to be informative and the following discussion to be fruitful. In addition to myself, the DACMPT Committee members are Drs. April Zenisky, Fred Oswald, Won-Chan Lee, Osvaldo Morera, and Sonia Esquivel. All members of the DACMPT were able to attend the meeting except for Dr. Won-Chan Lee.

Dr. Sofiya Velgach, Assistant Director of the Office of Accession Policy [AP], opened the meeting by introducing Dr. Katherine Helland, the Director of Accession Planning, and Mr. Leonard Litton, Principal Director for Military Personnel Policy (MPP). Dr. Velgach then provided some introductory remarks to establish the context for two presentations on ASVAB calculator use and the related discussions that followed.

The content of these presentations and discussions can be usefully organized around six different themes that, when considered together as a system of issues, should critically inform military decision makers of the nature, implementation, and implications of calculator use on the ASVAB.

Theme 1: Careful Problem Definition

Before leaders decide that the ASVAB should incorporate the use of calculators, the problem to be solved must be clearly articulated. Defining the problem leads to critical conversations among all stakeholders invested in refining the problem statement and ultimately solving it (e.g., leaders, technical advisors, researchers, SMEs, military personnel, and recruiters and recruits themselves). As a result of such conversations, research designs will better address the problem by informing subsequent operational efforts in an evidence-based manner.

Some *potential* problem statements surfaced in the DACMPT meeting, ones that might be usefully refined and extended:

Potential/perceived problem statements recommending ASVAB calculator use

- The no-calculator-use policy has negatively impacted recruiting, as well as the experience and stress levels of recruits.
- Other testing programs allow the use of calculators. The no-calculator-use policy for the ASVAB suggests a testing program that is not aligned with modern testing practices.

- ASVAB test scores tend to be too low, limiting the ability for aspiring recruits to meet established cutoffs required for branch-level selection (AFQT) and Military Occupation Specialty (MOS)-level classification (ASVAB subtests).

Theme 2: Assessing and Improving Military Readiness

The ASVAB critically improves military readiness, in terms of ensuring not only higher skill levels in those recruited (selection), but also better matches between the capabilities of selected recruits and the requirements of MOS openings (classification). To ensure that these two goals remain well met, one must understand how calculator use/non-use on ASVAB tests is aligned to the skill requirements across MOSs and the level of need for filling MOS positions over time. Essentially, for each MOS, two questions should be posed: When does the MOS require the use of math skills without a calculator (e.g., calculations that are simple or need to be done quickly), and when are calculators helpful or even necessary (e.g., to ensure accuracy and/or speed given a more complex problem)? To address these questions, the needs analysis that has been conducted should be revisited to ensure that it provides adequate guidance regarding the need for calculators across Military Services and MOS, in light of this proposed critical change to the ASVAB to incorporate calculator use.

Theme 3: Capturing the Effects on Calculator-based ASVAB Scores

Any ASVAB policy changes involving calculator use on the ASVAB will ultimately affect scores, the inferences made from those scores based on AFQT and MOS subtest cutoffs, and the selection and classification decisions that follow. Ensuring that ASVAB scores under a new calculator policy will reflect improvements in performance (or at least no harm) is an ethical responsibility that needs to be based on technical understanding. Therefore, the psychometric properties of the ASVAB under calculator use conditions will need to be researched extensively. This research includes investigating ASVAB reliability, dimensionality, validity, and subgroup differences (e.g., measurement invariance by sex, race/ethnicity). Focus group interviews with those implementing and taking the calculator version of the ASVAB will usefully supplement the psychometric information. Ultimately, this work will ensure that the decision to use the calculators on the ASVAB results in evaluations that remain fair to all examinees in measuring their aptitudes, ultimately reflecting operational improvements across the Military Services.

Theme 4: Transition to Operational Use

Related to the previous theme, there was a recognition among members of the DACMPT that implementation of the calculator-based ASVAB without conducting necessary research in preparation would be letting the cat out of the proverbial bag. A return to the current no-calculator policy may not be possible, even if short-term research suggests that the change has a negative impact on one or more outcomes of interest.

Moreover, a transition to operational use of the calculator-based ASVAB can be disruptive if the policy change and test administration are not consistent (e.g., use in Army recruiting before use in the other Military Services). Some operational issues can arise without prior planning (e.g., ensuring there are enough calculators, that they are in working order, that time is allocated to distribute calculators to examinees or to testing stations). Standardized administration conditions should be similar to the present ASVAB, if not an improvement over those conditions. Therefore, any ASVAB changes to be implemented will require an investment not only in early research (Theme 2 above), but also in eventual “transition costs,” that involve training test administrators under the new testing protocols,

incorporating calculators as part of the ASVAB investment and inventory, and establishing a shared culture of calculator use on the ASVAB across the Military Services.

Critically, some examinees may benefit from brief training on the use of the particular calculator that would be adopted. Providing that training to all examinees would standardize the process under the new testing regime, but doing so requires extra time. The concern is that without this training, calculators may not benefit lower-scoring examinees as hoped, and already higher scoring examinees will only stand to do better. The need for training is an empirical question to investigate, in tandem with the effects of calculator use (Theme 3).

Theme 5: Continuous ASVAB Program Monitoring

Related to the previous theme of transition to operational use, the integrity of the calculator-based ASVAB cannot merely be assumed once well-developed measures of effectiveness are developed and implemented. Data on all aspects of the test must continue to be collected and monitored to guide decision-making moving forward. Such data would be related to (but is not limited to) implementation and applicant flow, scoring and interpretation, and service applications. One proposed path would plan a calendar of specific check-ins built in to maintain program quality, while implementing operational changes iteratively. Monitoring and data-driven decision-making approach should, of course, be driven by appropriate problem definition (Theme 1 above) and metrics (Theme 6 below).

Theme 6: Carefully Defining and Collecting Outcome Metrics

Once the problems to be solved by the calculator-based ASVAB are well formulated (Theme 1), the data to be collected short- and long-term to evaluate the outcomes that matter to different stakeholders must be identified. Outcome metrics can be subjective (e.g., attitudes of recruits) and objective (e.g., recruitment numbers and flow); they can be narrow (e.g., classification outcomes) or broad (e.g., marketing efforts, informal attitudes of service members). Just as defining the problems to be solved requires an investment of time, attention, and conversation with key stakeholders, so does carefully defining outcome metrics. Analyses of comprehensive outcome data can inform whether and when progress is being made on the problems to be solved by the calculator-based ASVAB, and when corrective actions might need to be taken.

Summary

The DACMPT recognizes that there are no simple answers to the question of calculator use and the ASVAB and appreciates the careful approach to making such an important decision that Accession Policy and Defense Testing and Assessment Center (DTAC) are taking. There are multiple stakeholders whose needs should be attended to, and there are many consequences, both positive and negative, of introducing calculators or continuing to prohibit their use. We believe that the ASVAB is a critical factor in the Department of Defense's talent management strategies and a requirement for an effective military force. Decisions regarding the ASVAB must be informed by the careful research that AP and DTAC are known for. Any changes with the potential to degrade the ability of the ASVAB to select and appropriately classify military recruits must be undertaken cautiously.

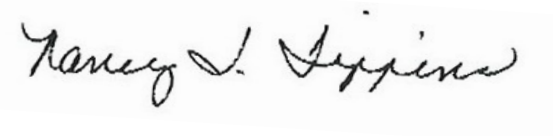
Recommendation

Continue with the planned research approach presented by DTAC. Research and subsequent transition plan should incorporate:

1. Clear articulation of the problem
2. Planned needs analysis
3. Impact on psychometric properties
4. Thoroughly designed transition including potential need for training of test administrators and applicants on calculator use and standardized roll out across the Military Services
5. Continuous program monitoring
6. Carefully defining and collecting appropriate outcome data

As always, the DACMPT is interested in supporting these efforts, as they provide strong, well informed, and timely justification for the intended interpretations and uses of the ASVAB. We look forward to our next meeting.

Sincerely,

A handwritten signature in black ink that reads "Nancy T. Tippins". The signature is written in a cursive style with a large initial 'N' and 'T'.

Nancy T. Tippins, Ph.D.
Principal, The Nancy T. Tippins Group, LLC
Chair, Defense Advisory Committee on Military Personnel Testing

Tab E



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For Open Publication**

Dec 01, 2023

Department of Defense
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Calculator Use on the ASVAB

D. Matthew Trippe
Defense Testing & Assessment Center (DTAC)

Briefing presented to the DACMPT
December 19, 2023

24-P-0142

Objectives

- Current policy on calculators
- Expressed concerns with current policy
- Background & potential impacts of immediate implementation
- Path forward
- Current status
- MAPWG member input
- DACMPT advice

Current policy with respect to calculators on ASVAB

- ASVAB test-taking policy does not permit use of calculators
- Test questions on the sub-tests Arithmetic Reasoning (AR) and Mathematical Knowledge (MK) are designed and developed to be answered without the use of a calculator
- Content developers assume mental or manual calculation when including numeric values, operations, variables, equations, etc. in test items
- Complexity of calculations is intentionally limited

Previous Research (Buckland et al., 2021)

- 2021 Calculator Use and the ASVAB Study
 - Surveyed Subject Matter Experts regarding the importance of math skills for success in training and on the job, and the necessity of doing math without a calculator
 - Given evidence that math without a calculator is needed in training and on the job, recommended maintaining policy of not allowing calculators during ASVAB.

Math without Calculator	In Training		On the Job	
	#	%	#	%
No Math Required	6	4%	6	4%
Always Have Tool	47	28%	66	40%
Basic Math w/o a Calculator	83	50%	74	44%
Algebra/Geometry w/o a Calculator	23	14%	15	9%
Higher Order Math w/o a Calculator	7	4%	5	3%

N=175 from representatives of 25 different career fields

Expressed concerns over current policy with respect to calculators

- Other national testing programs (e.g. ACT, SAT, GED) allow calculators on the quantitative tests
- Exclusion of calculators may result in the perception that OSD testing program is not keeping up with trends in assessment
- High school curriculum often allows calculators during instruction and exams
- Test items requiring manual calculations may result in increased test anxiety as students are not accustomed to performing such calculations
- Chief of Army has requested immediate implementation of calculators for ASVAB administration

Background

- The ASVAB is a large-scale, high-stakes assessment used for three primary purposes
 - Personnel selection: Determine if an applicant is qualified to enlist based on the Armed Forces Qualification Test (AFQT), which is a composite of Arithmetic Reasoning (AR), Math Knowledge (MK), Paragraph Comprehension (PC), and Word Knowledge (WK) scores
 - Classification: Assign applicants to jobs in the military using Service-specific aptitude area composites
 - Career exploration: facilitate career exploration for high school and early post-secondary students via the ASVAB Career Exploration Program (CEP) composite scores

Concerns regarding immediate implementation of calculators

- Impact(s) on validity
 - Decades of validity evidence is based on ASVAB administered without the use of calculators
 - Thousands of AR and MK items have been developed under assumption of manual calculation conditions
- Unknown psychometric impacts on
 - Difficulty
 - Dimensionality
 - Response time
 - Fairness
 - Norms
 - Composite cut scores
- Score Utility
 - Interpretability of scores (score meaning/definition)
 - Loss of score utility without a clear score meaning
- Statutory compliance
 - USC, Title 10, Sec 520, mandates how AFQT is to be applied for the purpose of enlistment. Specifically, the statute mandates a limitation on enlistment of applicants with an AFQT score between 10 and 30.
 - This implies an ability to accurately estimate aptitude. Immediate implementation of calculators for operational use on the ASVAB will result in changing the definition of the AFQT scores in unknown ways without substantiating science
 - Difficulty in faithfully complying with direction in the statute

Path Forward

- AP and DTAC have recommended and received funding to execute a two-phased approach to incorporating the use of calculators into the accession testing program
- Phase 1: Pilot Analysis (~2.5 years)
 - **A:** Identify “calculator sensitive” items
 - **B:** Data collection and analysis
 - **C:** Provide results to DACMPT members for scientific review and advice
 - **D:** Develop recommendation for moving forward based on pilot analysis results and DACMPT advice
- *E/F/G are contingent on pilot analysis results indicating absence of dimensionality or other substantive measurement issues associated with introduction of calculator use*
 - **E:** Equating study with current MK & AR
 - **F:** Policy updates and guidance
 - **G:** Operational software updates

Path Forward

- Phase 2: Develop new test(s) (~5 years)
 - **A:** Conduct needs/requirements assessment
 - Develop new AR, MK, or special purpose test
 - *B/C/D are contingent on findings in 2A (as well as Phase 1 A-D)*
 - **B:** Test development
 - **C:** Software Development
 - **D:** Data collection and validation analyses

- Phases 1 and 2 can be initiated simultaneously

Current Status

- Phase 1A: Identify calculator sensitive items
 - DTAC has provided HumRRO with ~200 MK and ~200 AR items for SME review of calculator sensitivity
 - Currently underway as of November 2023
- Phase 1B: Pilot analysis
 - Administer linear (non-adaptive) MK & AR forms at MEPS
 - Randomly assign applicants to calculator permitted or not permitted conditions
 - Collect identifying info to link to operational ASVAB records
 - Administer post-assessment questionnaire
 - Target analysis sample size of 1,500 per condition or 3,000 total
 - Data collection scheduled to begin December 2023 and run for approximately 90 days
- Phase 2A: Conduct needs/requirements assessment
 - Concurrent with phase 1A/1B

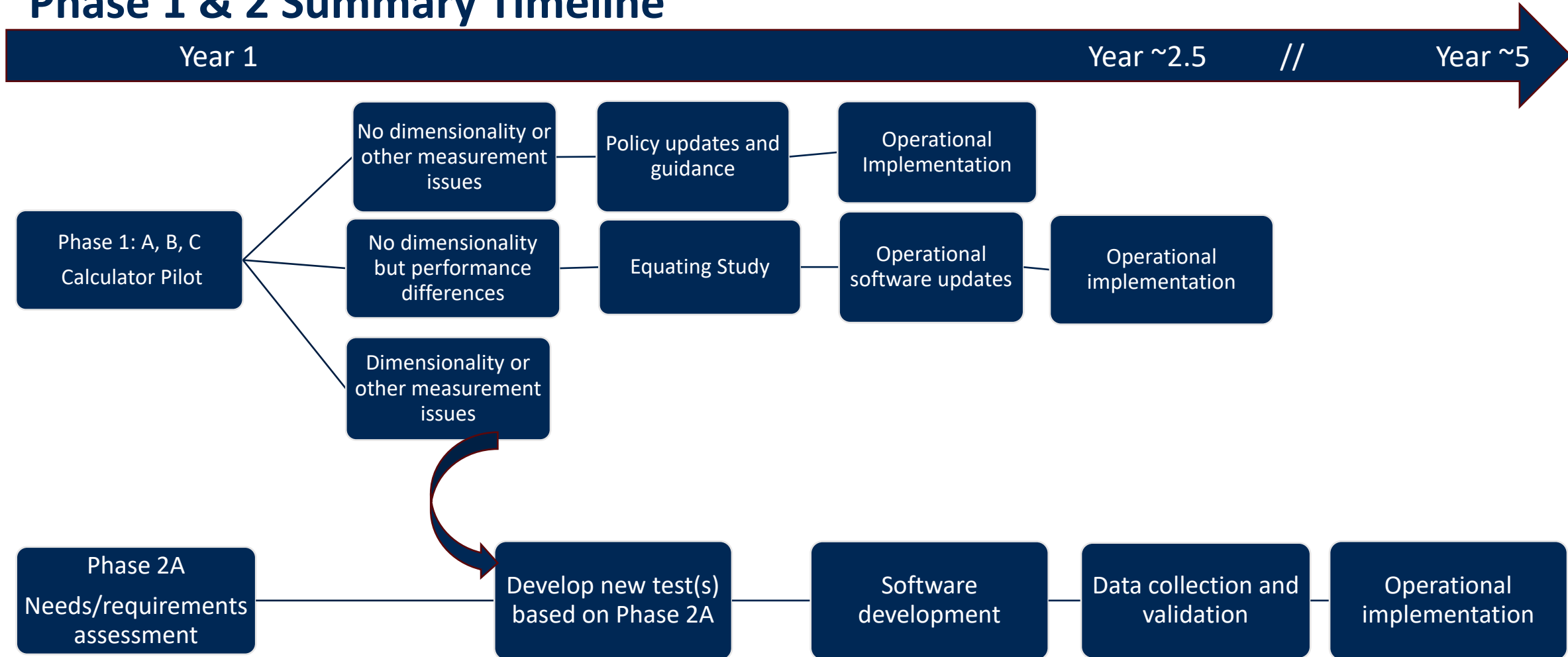
Phase 1B: Pilot analysis

- The research questions to be answered in this study include:
 - Does allowing calculators differentially impact examinee performance (e.g., scores, response time) on AR, MK, and AFQT?
 - Is this impact comparable across groups?
 - Does allowing calculators differentially impact item characteristics (e.g., IRT parameters, classical item statistics)?
 - Does allowing calculators impact test dimensionality?

Phase 2A: Needs/requirement analysis

- Determine whether it is appropriate to develop new MK, AR, or special purpose test that incorporates calculators
 - Review findings from previous research, including
 - Calculator Use and the ASVAB (Buckland et al., 2021)
 - ASVAB Training Relevance Survey (Adams, et al., 2022)
 - Collect training and technical job requirements data from Services to
 - Define job taxonomy
 - Define constructs to be measured
 - Inform item types and test specifications

Phase 1 & 2 Summary Timeline



Manpower Accession Policy Working Group (MAPWG)

- MAPWG met on October 10, 2023 to discuss calculator use on ASVAB
- AP representative informed the group of the Army's request for immediate operational implementation of calculators and summarized interwoven legal and scientific risks
- MAPWG representatives from the Navy, Marine Corps, Air Force, Space Force, and Coast Guard all concurred with the statutory and scientific risks associated with the absence of evidence on the potential impact
- The Marine Corps representative hypothesized that if only Army allows use of calculators more applicants may be drawn to Army if they perceive an easier route to accession in the zero-sum recruiting context
- All MAPWG Service representatives, except for the Army, are not in favor of immediate operational implementation of calculators on the ASVAB without substantiating science

DACMPT input/advice

For more information
please contact:

D. Matthew Trippe
david.m.trippe2.civ@mail.mil

Tab F



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Calculators on the ASVAB

Assistant Secretary of the Army (Manpower and Reserve Affairs)

Recruiting & Retention

DACMPT

24-P-0142



Immediate Use of Calculators on the ASVAB

ASVAB Modernization

- The US Army is fully supportive of the research efforts and subsequent, prudent work being done by the collective effort of the Defense Testing & Assessment Center (DTAC) & Accession Policy.
- There is also an understanding of the potential need to re-norm the test and the Army looks forward to supporting the chosen methodologies.
- Recently a trend of moving away from standardized tests immersed, but STEM intensive universities (i.e., MIT, Georgia Tech & Georgetown) have reverted to historical trends with the use of these tests.

Army's Request

- During a recent session of the Department's Manpower Accession Policy Working Group (MAPWG), the topic was discussed and not supported by other services for immediate use of a calculator on the ASVAB.
- The Army is of the belief that the environment, as compared to when the ASVAB was created, has changed and the non-usage of a calculator may impair the ability to gain a true understanding of an applicant's suitability for service.
- In most secondary schools, calculators are a key portion of mathematics instruction and the assessment of student proficiency.
- This request service-neutral and is not intended for use only by the Army.

Risk/Mitigation

- The Army acknowledges that there is potential risk involved to this request to include the effect to:
 - Test validity
 - Ongoing studies
 - Force readiness
- The Army is prepared to assume these risks with mitigations through Service-sponsored initiatives:
 - Future Soldier Prep Course - Academic Skills Development Program



Deputy Assistant Secretary of the Army, Military Personnel
Recruiting & Retention Policy

Mr. M. Ethan Blankenship, 703-695-4423