

Air Force Information Technology Test Development Initiative

The Armed Services Vocational Aptitude Battery (ASVAB) is a computerized adaptive test that consists of 9 subtests designed to measure various aptitudes used for selection and classification of 18 to 24 year olds entering into all of the US military Services enlisted positions. The current subtests include:

General Science (GS);
Arithmetic Reasoning (AR);
Word Knowledge (WK);
Paragraph Comprehension (PC);
Auto and Shop Information (AS);
Mathematics Knowledge (MK);
Mechanical Comprehension (MC);
Electronics Information (EI);
Assembling Objects (AO)

These subtests are combined into various composite scores that have been validated to predict success in technical training for a particular occupation. The DoD organization that develops the ASVAB, the Defense Manpower Data Center, retained the Human Resources Research Organization (HumRRO) to conduct an ASVAB review to determine if changes in ASVAB content and methodology could improve the predictive validity of the ASVAB to predict success in the technical training for specific occupations. To accomplish this review, HumRRO convened a four-member panel of experts in the areas of personnel selection, job classification, psychometrics, and cognitive psychology. These experts were Drs. Fritz Drasgow, University of Illinois; Susan E. Embretson, Georgia Institute of Technology; Patrick C. Kyllonen, Educational Testing Service; and Neal Schmitt, Michigan State University. One of the panel's recommendations states that research should be conducted to develop and evaluate a test of information and communications technology (ICT) literacy. The efficacy of coaching and item familiarity, as well as the feasibility of creating multiple forms, are being examined as part of this test development project. The Air Force has contracted with HumRRO to conduct this project. This project could result in a new subtest on the ASVAB. Additionally, as explained below this project may also lead to the development of a stand-alone screener for assessment of higher-level IT skills required for a group of more technical Air Force occupations.

Some of the unique aspects for this test development project include the nature of the military enlisted "hiring environment." On the one hand Air Force officers complete a bachelor's degree and then are employed as managers or work in their area of specialized training and with some exceptions (i.e., pilots, space and missile operations, weather forecasting, air battle managers) do not receive specialized military technical training. In the case of enlisted members, they are generally recruited into the Air Force directly from high school without specialized training and complete rigorous and expensive training equipping them to work as a technician in a particular occupation/specialty. The ASVAB is used for selection (entry into the Air Force) and classification (assignment to a specific occupation) based on the recruit possessing the necessary aptitudes for success in the

required technical training for a particular occupation. Additionally, the public sector must comply with the Civil Rights Act and Equal Employment Opportunity Commission's Uniform Guidelines on Employee Selection Procedures so our tests are rigorously vetted to ensure there is no adverse impact or unfairness against protected groups (race and gender).

There is a strong movement in the military to effectively develop and utilize global cyber technology. Occupations are being reorganized to develop specific jobs focused on these skills and responsibilities. Another possible outgrowth of this project is to develop a test that measures aptitude and skills required for these jobs.

The literature review provided has compiled critical background information for this project. We've also provided a draft example test plan structure. The contractor has identified gaps not adequately covered by the available published literature. We will address some of those gaps with information from subject matter experts. For other gaps we hope PTC members will have the knowledge and experience to assist us. The series of questions below articulate some of our concerns. We are interested in any published reports or findings that you could provide or point us to as well as your personal experience and opinions.

Questions:

1. Review of the ICT literature suggests that women experience more computer related anxiety, have less experience with and lower self efficacy toward computers than men. Nevertheless, the rather limited empirical evidence available reveals few differences between men and women on objective measures of ICT related proficiency. Similarly, census figures reveal that access to ICT differs among racial demographics, but there is little test data available to quantify potential racial differences in ICT related knowledge, skills or abilities (KSAs). *Can you provide technical reports, studies or data that may shed more light on gender or racial differences on measures of ICT proficiency? We are particularly interested in test score data (means and standard deviations) that would allow us to quantify the direction and magnitude of these potential differences.*
2. As in any test development effort, we are concerned with coaching, practice or familiarity effects. We are particularly concerned in the present context because of anecdotal reports that recruiters may coach examinees. We have reviewed the extant literature on these topics in achievement testing. *Can you provide best practices, benchmarks, or industry standards that would serve to mitigate the influence of coaching, practice or familiarity in measures of ICT aptitude or proficiency?*
3. We are particularly concerned with the potential for item/test obsolescence in our measure of ICT aptitude.

- a. *Which ICT content domains have you observed/ would you suspect to be most **resistant** to obsolescence?*
 - b. *Which ICT content domains have you observed/ would you suspect to be most **susceptible** to obsolescence?*
 - c. *Can you provide best practices for tracking and/or minimizing item obsolescence?*
 - d. *Can you provide best practices, benchmarks or industry standards regarding the frequency content review in an ICT context?*
4. We will develop more than one form of our measure of ICT aptitude following guidelines provided by AERA, APA, and NCME.
- a. *Do you foresee or have you experienced issues or problems in developing equivalent forms of ICT knowledge and skill that may not be addressed in standard test development practices?*
 - b. *Can you provide best practices, benchmarks or industry standard for developing parallel or equivalent forms in ICT testing?*