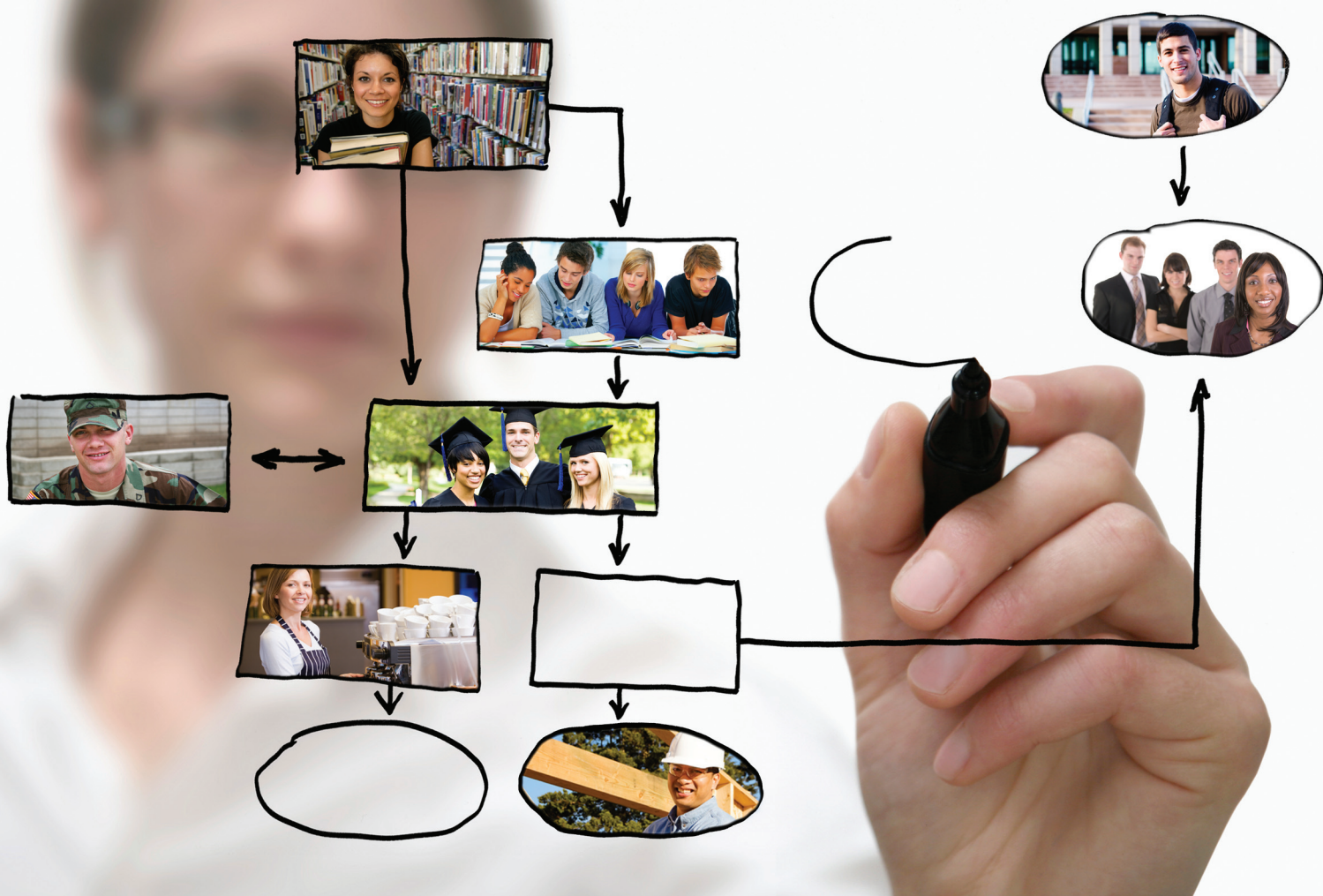


# MAKING NEW LINKS

## 12<sup>th</sup> Grade and Beyond



### Technical Panel on 12<sup>th</sup> Grade Preparedness Research Final Report

National Assessment Governing Board  
U.S. Department of Education

# WHAT IS NAEP?

The National Assessment of Educational Progress (NAEP) is a continuing and nationally representative measure of trends in academic achievement of U.S. elementary and secondary students in various

subjects. For four decades, NAEP assessments have been conducted periodically in reading, mathematics, science, writing, U.S. history, civics, geography, and other subjects. By collecting and reporting informa-

tion on student performance at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education.

## National Assessment Governing Board

The National Assessment Governing Board was created by Congress to formulate policy for NAEP. Among the Governing Board's responsibilities are developing objectives and test specifications and designing the assessment methodology for NAEP.

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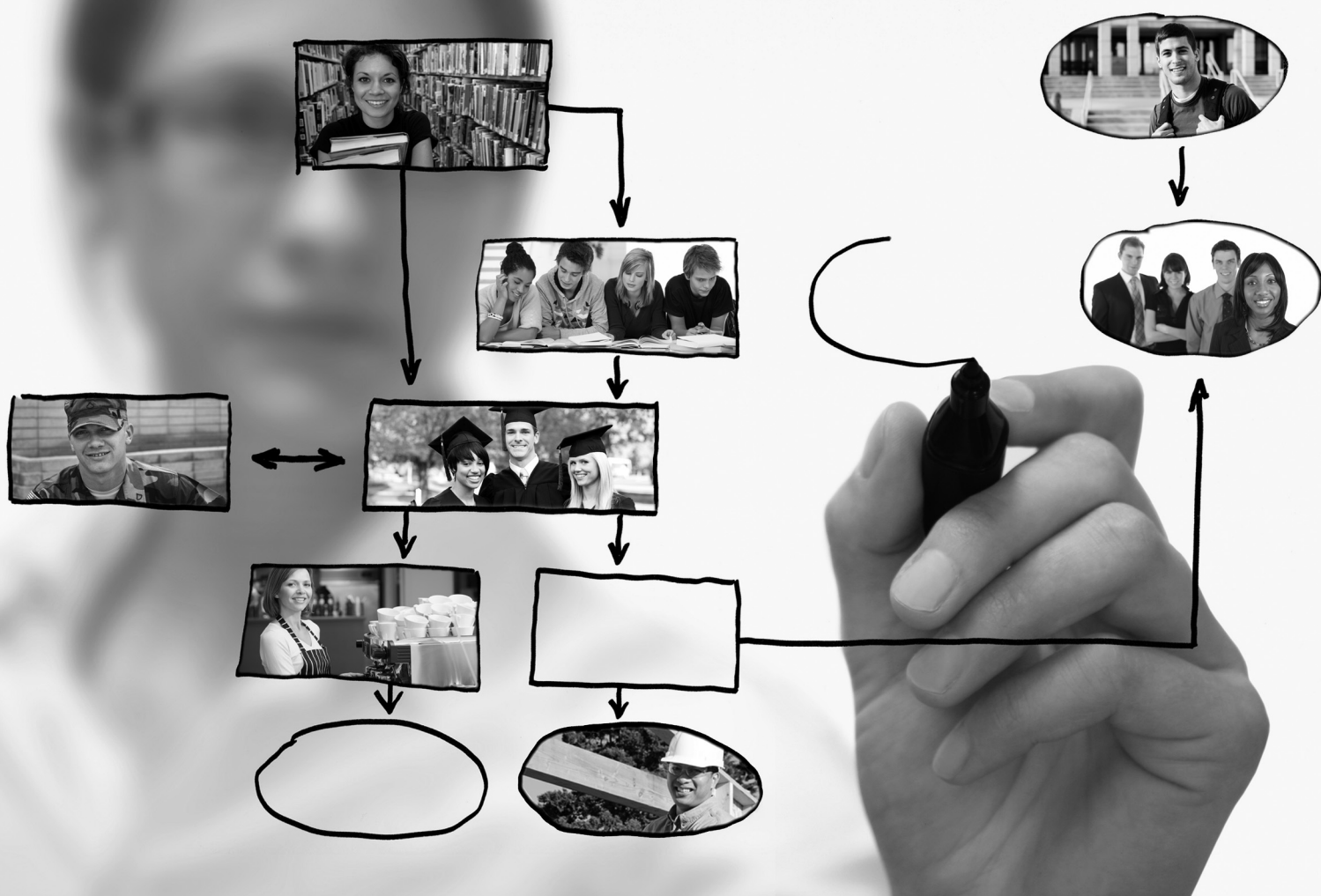
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# MAKING NEW LINKS

## 12<sup>th</sup> Grade and Beyond



### Technical Panel on 12<sup>th</sup> Grade Preparedness Research Final Report

National Assessment Governing Board  
U.S. Department of Education

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## ***Acknowledgments***

The Technical Panel on 12<sup>th</sup> Grade Preparedness Research is grateful for the participation and contributions of Governing Board Chair Darwin Winick and Board staff Interim Executive Director Mary Crovo, Assistant Directors Susan Loomis and Ray Fields, and Research Associate Michelle Blair, as well as former Executive Director Charles Smith. The Panel also expresses appreciation to Susan Loomis and Michelle Blair for their work in reviewing the Panel's deliberations and compiling its recommendations for development of the final report.

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Suggested Citation: National Assessment Governing Board (2009).

*Making New Links, 12<sup>th</sup> Grade and Beyond: Technical Panel on 12<sup>th</sup> Grade Preparedness Research Final Report.*

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**June 2009**

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For sale by the U.S. Government Printing Office  
Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-0328

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# Postsecondary Activities of Interest

## COLLEGE PREPAREDNESS

As stated earlier, the Panel recommends that the definition of college preparedness be focused on credit-bearing general education courses, including those eligible for transfer from two-year to four-year institutions. By definition, these courses are non-remedial, which is consistent with the Governing Board's earlier conceptualization of preparedness as being free from the need for remediation. It is important to note that the nature and degree of remediation a student may need are beyond the scope of the Panel's ideas for reporting preparedness on NAEP.

Altogether nearly half of all postsecondary education students are enrolled at two-year colleges, with an increasing number of students using the two-year college as a pipeline for four-year college transfer. Focusing on credit-bearing courses that offer transfer credits ensures the inclusion of two-year transfer programs in the determination of preparedness. The Panel's recommended study designs and definition of college preparedness address this and other key trends and issues listed below.

### Issues

- *Articulation between two-year and four-year institutions* – Students seeking to transfer from two-year to four-year institutions face a range of state policies regarding transfer credits. In some states, completion of a two-year program is universally accepted by the state's four-year institutions as a signal of preparedness and eligibility. In other states, the four-year institutions may layer additional requirements that students must meet before being eligible to enter.
- *Institution-specific criteria for non-remedial course placement* – Tremendous variation exists across postsecondary institutions in the types of placement tests used, the cut scores associated with placement into non-remedial coursework, and the optional or mandatory nature of such placements. This variation exists within and between institutions within a state and across states.
- *Discipline-specific criteria for non-remedial course placement* – Within specific disciplines or college majors, specific criteria may be applied to determine whether a student needs remediation. For example, a solid grounding in trigonometry may be an essential element for preparation in a subset of fields of study. In some states, articulation agreements governing transfer credits from two-year to four-year institutions are specific to each discipline as well.
- *Eligibility for non-remedial course placement versus eligibility for admission to postsecondary education institutions* – Admissions selectivity criteria are separate from criteria used for non-remedial course placement.
- *Varying levels of admissions selectivity* – Two-year institutions and some four-year institutions are “open admissions” because they admit all applicants. Four-year institutions are more likely to impose criteria for the students they admit, and these criteria may reach beyond reading and mathematics knowledge and skills.
- *Diversity among two-year college institutions* – The mission of community colleges varies widely, with some functioning as a major source of job training within a community and others focusing on preparation for four-year institutions. Generalizing across all community colleges and treating them as a uniform set of institutions could hamper results of NAEP preparedness studies.



- *Lack of systematic course placement data* – Use of popular placement assessments such as ACCUPLACER, ASSET, and COMPASS varies dramatically across institutions. Each may house its own data and determine its own cut scores. Further, some institutions use locally developed placement instruments, which may even be specific to particular academic departments of the college.

The list of challenges here is not exhaustive, but it represents key considerations the Panel has examined while crafting study recommendations.

### ***Responsive Strategy: Use Preparedness Indicators to Locate Points on the NAEP Scale***

To address these issues, the Technical Panel has determined three critical resources necessary to support NAEP preparedness studies with respect to college preparedness:

- *Assessment instruments* widely recognized as indicators of college preparedness, such as ACT and SAT, as well as assessments used for course placement, such as ACCUPLACER, ASSET, and COMPASS, can be studied in relation to NAEP.
- *Preparedness standards and benchmarks* are available, and several of these sets of standards have been compiled through rigorous processes and are widely reflective of the reading and mathematics knowledge, skills, and abilities needed to be prepared for non-remedial college-level general education coursework.
- *Subject matter experts* across subject areas, i.e., reading and mathematics, as well as across specific postsecondary education roles, i.e., professionals specializing in remedial placement, will identify the appropriate academic performance standards and postsecondary education settings.

The study designs proposed by the Technical Panel for college preparedness make extensive use of these three resources. With an emphasis on placement in non-remedial college coursework, it is important to acknowledge one possible outcome of the studies focused on college preparedness: the composite range of cut scores on a particular assessment indicating

non-remedial placement across various postsecondary education settings could cover a large range.

## **WORKPLACE PREPAREDNESS**

Many of the jobs students can obtain immediately after high school graduation offer advancement potential via a career pathway and the eventual capacity to earn a wage sufficient to support a family after appropriate training. Because many of these jobs require considerable training, the National Commission on NAEP 12<sup>th</sup> Grade Assessment and Reporting proposed in 2004 that prospective NAEP preparedness reporting focus on job training. An array of occupational training options is available: on-the-job training, an in-house training program, a formal apprenticeship program, a training program in a community college, or training in a vocational institute or program. The Technical Panel's definition of workplace training encompasses all of these. Challenges to targeting such programs are listed below.

### ***Issues***

- *Addressing the diversity of occupationally oriented postsecondary education paths* – It is important to recognize that preparedness addresses training in an organization (e.g., on-the-job training and apprenticeship) as well as vocational training at a community college or institute.
- *Distinguishing qualifications for the job from qualifications for the job's training program* – Preparedness to be hired for the jobs of interest and preparedness to enter the training programs for the jobs of interest are not the same.
- *Identifying appropriate resources for studies* – Many resources that can be used for NAEP preparedness studies target qualifications for the job, which means these resources would require further refinement to target qualification for job training, which is the goal of NAEP preparedness research. Further, most research to develop academic standards for occupations focuses on higher performance levels or success in the occupation.
- *Identifying training programs with national scope* – For national reporting about preparedness, the qualifications, academic content standards, and



assessments for any given occupation that NAEP targets should be consistent nationally to ensure that preparedness for the occupation means the same thing across the country. Many occupations do not have a nationally consistent training core.

- *Identifying occupational training profiles equivalent in military and civilian sectors* – Equivalence between similar occupations in the military and civilian sectors cannot be determined without analyzing the occupational profiles in depth. A crosswalk for military and civilian jobs has been established using a common coding scheme. The equivalence of jobs from the two sectors should be confirmed for the job training programs selected for NAEP preparedness. For occupations that generally require the same qualifications across the military and civilian sectors, there may be some differences across the two sectors because of the different environments for the occupation.
- *Addressing occupations with differing academic emphases* – Some occupations require substantial geometry, whereas others may focus more heavily on algebra or simple numerical computations, for example. The NAEP scale incorporates all of these mathematics skills. If only a subset of such skills is required, this may not align with NAEP scaling procedures. The feasibility of setting preparedness standards for each of the major sub-domains (e.g., algebra, statistics, etc.) should be investigated.

### ***Responsive Strategy: Use Exemplar Occupations***

In addressing these challenges to targeting workplace preparedness, the Panel has crafted a research strategy to identify five to seven occupations to serve as exemplars, selected on the basis of criteria. These exemplars are the occupations deemed most informative for estimating the entry-level reading and mathematics requirements for multiple sectors of the labor force. Appropriate subject matter experts (SMEs) would identify points on the NAEP scale representing the entry-level reading and mathematics qualifications needed for training in the respective occupations. If, for example, air conditioning technician were one of the exemplar occupations, a training program for that occupation would be identified, and a group of appropriate SMEs would be engaged in standard-setting

procedures to identify the cut scores on the NAEP scales. The greater the extent to which the exemplar occupations represent a broad range of critical occupational categories, the greater the potential of the NAEP preparedness statements to provide information about the preparedness of 12<sup>th</sup> graders for entry into job training.

Identification of these five to seven exemplar occupations should be considered the first phase of the process, with an incremental approach leading to more exemplar occupations that would eventually represent the full population of relevant occupations.

In line with this strategy to use exemplar occupations, the Technical Panel has identified critical resources to support NAEP preparedness studies with respect to workplace preparedness:

*The Occupational Information Network (O\*NET) taxonomy* is the nation's primary source of occupational information. Central to the program is the O\*NET database, containing information on hundreds of standardized and occupation-specific descriptors, including information regarding typical income of an occupation's workers and the typical educational requirements for qualification. The database is continually updated by surveying a broad range of workers from each occupation. For the purposes of NAEP preparedness research, the focus will be on two classification zones of O\*NET: O\*NET job zones 2 and 3. A dental assistant is an example of a zone 2 occupation requiring three months to one year of job training. A reading skill needed for this occupation is the ability to understand written sentences and paragraphs in work-related documents. A construction manager is an example of an O\*NET zone 3 occupation requiring one to two years of job training. Mathematics requirements for this occupation include knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications. See the informational endnote on *O\*NET Zones for NAEP Preparedness Research to learn more about zones 2 and 3*.<sup>1</sup>

*Exemplar identification methodologies from previous research* include models for this kind of exemplar-anchored research strategy. The data

needs for this type of research can be found in the American Diploma Project Benchmarks by Achieve (2004), which used an exemplar occupation approach for workplace preparedness.

*Assessment instruments* widely recognized as indicators of workplace preparedness, such as ACT WorkKeys and ASVAB, as well as assessments used to indicate qualification for specific training programs, can be studied in relation to NAEP.

*Preparedness standards and benchmarks* can be used as sets of standards compiled through rigorous processes and reflective of the knowledge, skills, and abilities needed to qualify for entry to job training programs.

*Subject matter experts* across subject areas, i.e., reading and mathematics, as well as across specific workplace contexts, i.e., front line supervisors and job training program instructors or administrators, will support strong connections to the appropriate academic performance standards and workplace settings.

### **Strategic Principle #1: Implement criteria for the features of occupations most useful for NAEP preparedness reporting.**

In extensive discussion about the desired traits discussed by the Board and other traits of occupations, the Technical Panel proposes the following set of criteria to be used in selecting exemplar occupations.

- *O\*NET zones 2 and 3* – These zones collectively represent occupations requiring three months to three years of training. The Panel judges that these educational requirements are most appropriate to the goals of NAEP preparedness reporting.
- *Availability of civilian and military counterparts* – To promote reporting across military and civilian sectors, it is necessary to select exemplar occupations that have cross-sector counterparts. Identifying counterpart occupations in the military sector would be a key consideration throughout the process of identifying exemplar occupations.
- *Coverage of industry sectors* – Exemplars should come from a broad range of industries to the extent possible.

- *Recognition of occupations* – To assure usefulness and relevance to the public, exemplars that are familiar to the public should be selected.
- *High employment level projected into the future* – In absolute numbers, the exemplars should cover a large proportion of jobs and job openings, and should not be projected to decline in the future. Focusing solely on high growth rates can be misleading when they represent a small proportion of jobs and fluctuate from year to year. Therefore, occupations with high growth rates should be considered only when they also represent a high proportion of jobs.
- *Coverage of reading and mathematics preparedness* – Taken together, the exemplars should represent a range of reading and mathematics skills along the NAEP scale. This may result by default from application of the previously mentioned proposed criteria, but it will be important to explicitly review this at some point in the exemplar selection process.
- *Representation of different training paths* – As noted earlier, it is important to represent apprenticeships as well as vocational training or community college programs.

### **Strategic Principle #2: Focus on occupations with job training entry requirements that are interchangeable between military and civilian sectors.**

The nationally consistent core of the military's training programs could prove invaluable to the NAEP preparedness studies. As noted above in the list of issues, national consistency in job training is a challenge, i.e., whether a training program is administered in a standardized manner across the country or whether its entry requirements are uniformly applied across the country. The Technical Panel suggests taking advantage of the vast resource of the military's training programs. However, the Panel has also noted that starting the exemplar selection process and analysis in the military sector (and then cross-referencing to the civilian sector) may be especially burdensome, given the limited time availability of military personnel who may serve as subject matter experts.

**Suggestions for the Exemplar Identification Process**

To identify exemplars, the Panel suggests starting with a listing of all occupations that require from three months to three years of training (collectively known in O\*NET as zones 2 and 3). Then, remove occupations from the list if they do not have the desired growth rate and employment level (number of jobs in the national economy). Next, review the list of remaining occupations to identify whether there are occupations that have a nationally consistent set of training standards or training-program entry qualification criteria that can be used as targets in NAEP preparedness research. The group of occupations can be further reduced by selecting those that maximize diversity—across industries, for example—while also meeting other criteria of interest to the Board.

This set of exemplar occupations can be related to similar occupations in the same category through an analysis of the O\*NET taxonomy of occupational classifications. Using this taxonomy, NAEP preparedness research could potentially generalize statements of preparedness for these selected occupations in relation to similar occupations outside of the final set of exemplars.

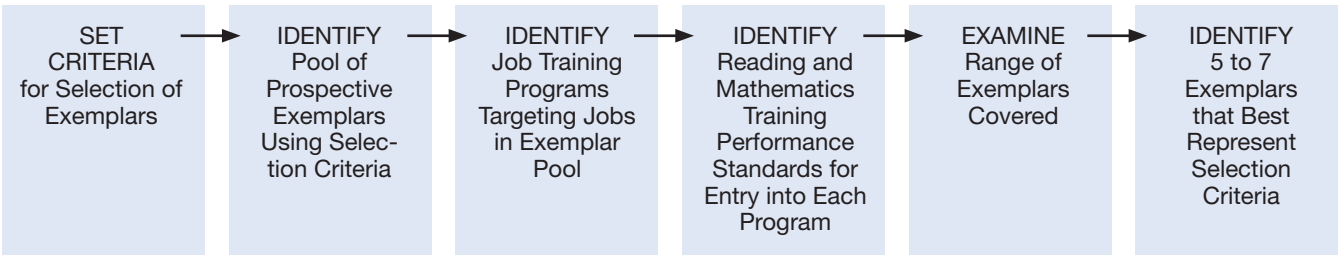
To assist exemplar selection and the operationalization of these exemplars into reference points or ranges on the NAEP scale, the Panel agrees that there should be an extensive review of the availability of industry training standards, such as those from the National Automotive Technicians Education Foundation. This review will help to identify training programs that are nationally standardized, which, as noted above, is a

key challenge for workplace preparedness research. Other resources to identify industry training standards may include:

- Companies supplying temporary workers – Some companies place professional and permanent workers as well as temporary workers.
- Employer associations – Some companies provide services for employers who do not have in-house programs.
- Labor unions – Several unions provide training as well as assistance for new apprentices that cover the prerequisite knowledge and skills needed for an occupation.
- Professional associations – Some, such as the American Electrical Association, have conducted analyses of exemplar occupations within their respective fields, and their approach may serve as a model for identifying the types of data to collect in a study focused on exemplar occupations.
- Entities certifying job training programs (inside and outside of community college settings) – Some, such as the National Council for Continuing Education and Training, oversee many programs in community college settings that provide an associate’s degree concurrently with job training certification.

**Collaborations with the Department of Defense**

The Technical Panel sees great need for military collaboration to maximize the success of the NAEP grade 12 preparedness research initiative. The Panel recommends asking senior leaders of both the U.S. Department of Education and the U.S. Department of Defense for support. The demands on military personnel and other resources related to war and



**Figure 3-1. Process to Identify Exemplar Occupations.** This depicts the key parts of the process to identify exemplar occupations. Depending on the range of exemplars identified, deliberate efforts may be needed to widen the set of exemplars. For example, a national set of industry training standards may not be available for all potential exemplars. This may require developing appropriate reading and mathematics knowledge and skills statements via subject matter expert panels. These statements would then be used to set cut scores on NAEP.



national security may be a formidable challenge to their involvement in NAEP preparedness research and must be taken into account.

## **SPECIAL CHALLENGES TO THE RECOMMENDED METHODOLOGIES**

The Governing Board has indicated a special interest in studies to establish statistical relationships between NAEP and other external indicators of preparedness. The Technical Panel has devoted extensive discussion to design issues, and has invited company representatives and state assessment staff members to provide details that would further clarify those issues. A major concern has been assessment organizations' protocols regarding confidentiality of test questions and related assessment materials. This concern makes it difficult to maintain a rigorous and consistent study design across multiple assessments. The Technical Panel has met with representatives of ACT and the College Board to discuss feasibility issues in great detail. Board staff members will continue efforts to identify the feasibility of collaborations for the proposed studies. The Panel encourages the Governing Board to continue to identify sources of data that can be shared for NAEP preparedness research.

The following is a list of challenges that were identified in the Panel's internal deliberations and conversations with external partners.

### ***Collaboration Opportunities for Accessing Data***

*Materials from Other Assessments* – Agreements are needed to secure materials required for content alignment studies, for example. Although the Technical Panel has called for consistency across content alignment studies to the extent possible, there are some fundamental challenges. Assessment companies are protective of their items, test specifications, and blueprints, citing proprietary considerations or long standing institutional philosophy and practice.

*Score Data for Other Assessments* – Collaborative partnerships may be difficult to establish, but are essential to accessing score data for other assessments to enable the statistical relationship studies.

A comprehensive longitudinal database, such as Florida's, is one way to access the data needed for the statistical relationship studies to relate NAEP performance for 12<sup>th</sup> grade examinees with scores on other assessments. These other assessments of interest could have been taken either before (college admissions tests) or after (course placement tests) high school was completed. Alternatively, collaborative partnerships can be formed directly with testing companies housing the needed score data. Both of these routes may be difficult, but they are necessary for statistical relationship studies.

*Incorporating a Variety of Assessments* – Although one study proposed by the Technical Panel will identify SAT examinee matches across the 12<sup>th</sup> grade national NAEP sample, relatively few students in the central states of the nation take the SAT. Although a parallel national study for ACT data is not yet feasible, the Florida database provides the potential for establishing a state-level statistical relationship between NAEP and the ACT. A full-scale content alignment study in which an independent organization would compare ACT specifications and items to the NAEP framework and items is not yet feasible, but the Panel recommends proceeding with a statistical study involving these ACT data for Florida. The Technical Panel has also recommended that Governing Board staff members determine if any of the grade 12 NAEP pilot states have large samples of students taking ASVAB.

### ***Technical Challenges in Study Design***

*Content Alignment and the Newer Context of Test-to-Test Alignment* – Traditionally, content alignment studies have been conducted to evaluate the relationship between an assessment and a set of content specifications (or frameworks). Examining the alignment between two tests represents new territory. To identify the best methodology for NAEP preparedness research, the Technical Panel recommended convening an advisory group to identify the key elements of content alignment studies and how they should be standardized to assure procedural validity.<sup>2</sup> The Panel considered a wide range of issues specific to NAEP preparedness research, such as the areas of design specifications that should be standardized to support consistency across content alignment studies. The

Panel also noted the need to avoid over-specifying the design and to allow flexibility so that studies can yield information about degrees of alignment. A related issue is the need to ensure consistent usage and operationalization of terms that tend to be used in a variety of ways across education contexts.<sup>3</sup>

*Content Alignment and the Newer Context of Alignment with Computer Adaptive Tests* – Computer adaptive assessments are often used to efficiently gather information about the knowledge, skills, and abilities of entering college students. These assessment instruments involve a large number of test items, and there is limited research addressing how to conduct alignment studies with these instruments. The Panel recommends that the Board solicit focused advice in this area to ensure a sound and rigorous design.

*Statistical Relationship Studies and Differences in Assessments* – As previously stated, NAEP is unlike other assessments of U.S. students. NAEP includes constructed response items in all subject assessments, whereas assessments such as those developed by ACT and the College Board are largely or solely based on multiple choice items. Only NAEP has a nationally representative sample of students overall. Some assessments, such as the ACT and SAT, are national in scope, but usage is concentrated geographically and generally limited to college bound students. In some cases, these tests are mandated for all high school students. Despite these cited differences, it should be possible to establish meaningful statistical relationships.

*Judgmental Standard-Setting Studies and Commitments of SME Panelists* – NAEP preparedness studies will depend on collaboration from postsecondary education course placement professionals; business community and military personnel representatives; and content experts. For some of the studies, multiple expert perspectives may be needed on the same SME panel. Military personnel representatives may be least likely to be available for these studies. (If exemplar occupations are in the Air Force or the Navy, that could be beneficial as these branches are potentially more available than the Army during this time of war.) In considering potential SMEs knowledgeable of entry requirements related to ASVAB, instructors at military

schools and former ASVAB technical panel members could conduct the standard setting on NAEP if those choices are acceptable to ASVAB leadership. ■

