



The Linkage System[©]

Linking Academic Content Standards and Occupational Skill Standards



The Linkage System®

Linking Academic Content Standards
and
Occupational Skill Standards

A Process
to Enhance Workforce Quality
and
Improve Academic Performance

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Abstract

The *Linkage System*[®] is a process designed in 1997 to improve academic performance for all students, and enhance workforce quality by linking academic content standards to occupational skill standards. Linking the results of standards development efforts and identifying academic content in an occupational context will provide a significant base of materials for contextual instruction and scenario development. Focused teacher in-service utilizes the results of the *Linkage System*[®] to develop contextual instruction materials to increase the numbers of students achieving high academic standards.

The Linkage System®

The Linkage System® has the potential to improve today's education and workforce preparation system, responding to challenges that include:

- National, state, and local concerns about the lack of skills required of the workforce, for both entering and incumbent workers
- National and state emphasis on “high” and “challenging” academic standards at all levels
- Continuing high dropout rates
- Academic instruction that does not relate to post high school lives
- Scarcity of workers with technical skills

System Research Base

The *Taxonomy of Academic Performance Indicators (TAPI)* (2000) is a revision of the *Basic/Essential Skills Taxonomy* (1989), developed by Dr. Lester Snyder at Arizona State University for a project sponsored by the Arizona Department of Education. The *Taxonomy* was validated by 18 V-TECS member states using a rigorous review process to verify the accuracy of the academic content. It was reviewed and revalidated with minor editions in 2000.

The *Taxonomy* was designed as an analysis tool that would provide a common, unambiguous academic vocabulary to analyze text and other curricular material. The academic skills listed in the *Taxonomy* are not designed as instructional/curriculum content, but as a descriptive listing of concepts. Each Mathematics, Language Arts, and Science skill is stated with precision, providing for the communication of academic skill requirements to assessment and curriculum developers.

Arizona, a member of V-TECS, contributed the *Taxonomy* to VTECS in 1990 for use in member state occupational analysis projects. During the ensuing years, 1991 to date, the Mathematics, Language Arts, and Science skills required of competent workers in more than 40 occupations have been identified. Since adoption of the *Taxonomy* by the V-TECS Board of Directors as the basis of V-TECS's work in the academic arena, scores of subject matter specialists and academic instructors have participated in group processes to identify the academic skills they use to perform occupational specific duties and tasks.

Given its design, the *Taxonomy* is a unique tool that can be used to analyze not only occupations, but other content as well. The academic content standards analysis conducted by states such as Virginia, South Carolina, Arizona, Illinois, Maryland, and Maine exemplify the latest use of the *Taxonomy*. Use of this common vocabulary allows states to crosswalk existing and future *Taxonomy* based instructional products to their state's unique academic

standards. Ultimately, participating states will have access to a rich contextual instruction resource, the V-TECS database.

National initiatives include the analysis of the Cisco Networking Academy Program content and the ASE automotive technician tasks to identify academic skill requirements. Other national efforts are ongoing.

The Linkage System[®]

This system is based on research and development conducted by V-TECS and implemented in states across the nation. The key is the Taxonomy, the primary communication tool for this system. When used in conjunction with contextual statements developed around occupational skill standards and implemented using instructional scenarios, the potential for addressing differing learning styles is significant. Extensive research has been conducted on contextual instruction benefits to learning.

This research, coupled with the common sense notion that meaningful learning is better attended to and retained, only enhances this concept.

The *Linkage System*[®] includes the following steps:

- 1) Analyze the state adopted academic content standards to identify the *Taxonomy* skills that operationally define each Mathematics, Language Arts, and Science standard.
- 2) Analyze occupations or vocational-technical program skill standards to identify academic *Taxonomy* skills required for competent performance. These are called the “related/required academic skills” (RAS).
- 3) Crosswalk the occupational related academic skills to state academic content standards.
- 4) Develop instructional/assessment scenarios that include occupational and academic standards.
- 5) Load the cross-walked materials into the Linkage System database (under development).

Step 1: Analyze the state’s academic content standards.

Train the state’s academic content experts (analysts) to use the system and related tools. There should be at least two experts in each area, given the need for discussion on the applicability of specific *Taxonomy* items to any given content standard. The analysis team receives information on the background of the *Taxonomy*, objectives of both the analysis and the further use of the materials once developed, and initial analysis of the standards. The teams then systematically review the standards, identifying the *Taxonomy* skills that operationally define each standard.

Step 2: Identify the related academic skills (RAS)

required for competent performance in the occupation or vocational-technical program, assuming they have not been previously identified using the *Taxonomy*. In this part of the *Linkage System*, experts in the occupation/vocational-technical program, assisted by academic content experts, review all of the skill standards to determine the specific academic skills required of an expert performer for competent performance.

Step 3: Crosswalk the academic skills required for competent performance in the state’s vocational-technical program to the state’s academic content standards.

Step 4: Develop contextual statements that bring together the academic content standards and occupational skill standards using real life examples. Simply stated, contextual statements identify how specific academic skills are used or applied in the workplace. These are not abstract applications,

but rather, applications that learners (regardless of age) can identify as realistic. Development of contextual statements is accomplished through a group process designed to provide the training for writers to be able to develop the statements. A trained V-TECS facilitator leads the groups, with the primary concern of developing broad-based contextual examples that avoid trivial applications of the skill—“trivial” being defined as applications that only occur on rare occasions or are utilized by a very few employees in the occupation.

Contextualizing academic content standards provides for the improvement of both academic and occupational instruction, for these reasons:

- Vocational-Technical instructors can assure that the required academic content is included or imbedded in their instruction. This will provide opportunities for academic skill reinforcement for students enrolled in the occupational preparation program, and provide assurances to employers that the required academic content is covered in the program.
- Academic instructors will be able to use the statements as “context” for academic instruction, providing instruction that has more utility to the learner, and is more robust as a learning tool for the majority of students.
- Scenario developers will have a resource that can be used to assure that the scenarios developed for

instruction/assessment provide complete coverage of the technical and academic content.

- The role of vocational-technical education in helping students learn, retain, and achieve the state's academic content standards is further defined.

Linking academic and occupational skill standards provides a powerful tool for instructors in the development of contextual instructional and assessment materials. As reported by numerous authors (Bailey 1998, Bottoms [et al.] 1997, Raizen 1989, Smith [et al.] 1998, Stasz [et al.] 1993), contextual instruction provides significant improvements in learning and retention of instruction among learners of all age groups.

Once the contextual skills are identified for the occupation or vocational-technical program, they provide a significant resource base for dialog between vocational and academic instructors. This further facilitates the objective of integrating academic and vocational education.

Finally, the contextual materials furnish a base for developing scenarios that are rich in context and provide tools for instructors to deliver and assess student instruction. For a further discussion of scenario development, see *Using Skill Standards for Vocational-Technical Education Curriculum Development* (Losh, 2000).

Conclusion

The V-TECS system for linking academic content standards and occupational skill standards provides rich instructional resources for both vocational-technical and academic instructors. Identification of the academic skills required for competent workplace performance provides tools for enhancing the quality of both workforce and academic performance. Each area reinforces the other, and addresses one of the major challenges faced by educators—providing instruction that will improve student academic performance.

Use of the *Taxonomy* as an analysis tool is well established. Implementing the V-TECS *Linkage System* provides additional resources to improve instruction for all students, and will significantly enhance existing instructional resources.

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