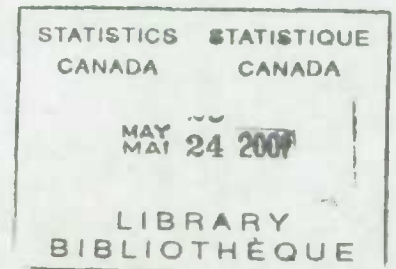# Framework for the Assessment of Basic Employability Skills

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The purpose of this framework for the International Life Skills Survey (basic employability skills) is to focus discussion of the final selection of specific life skills and possible assessment measures for the selected skills. The audience consists of members of the International Life Skills Survey Working Group. This survey is a follow-on to the International Adult Literacy Survey (Organisation for Economic Co-operation and Development/Statistics Canada, 1995). In that survey, literacy was defined as

> using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential. . . . The IALS experts decided to define literacy in terms of three domains, each encompassing a common set of skills relevant for diverse tasks: *Prose literacy; Document literacy*; *Quantitative* literacy. (p. 14)

The context for literacy was at work, at home, or in the community. As stated in the same report, "some other types of knowledge and skill (including teamwork, interpersonal and other communication skills) were recognized as important, but could not be measured with the resources available" (p. 14).

The purpose of the follow-on survey on life skills is to assess such skills. This document was written after our initial meeting in Amsterdam (October 1996) in which member countries stated that they felt the Life Skills Survey was feasible.

The document itself consists of both ideas and text abstracted from prior documents written by the authors (including modifications from our prior published work), as well as information specifically generated for this report. It is intended as a background paper and, as such, is not to be published.

The Context

Current economic difficulties and the challenge of competing in the world market have necessitated a rethinking of approaches to the utilization of people in organizations. Management now recognizes a need to have workers take on more responsibility at the points of production, of sales, and of service rendered, if an individual country is to compete in rapidly changing world markets. In order to adapt to the need to introduce new products and services quickly with high quality, new directions in management emphasize participative management, flatter organizational structure, just-in-time management, total quality management, team work, and an increasing interest in certifying such skills. This development means that much more is expected of even entry-level members of the workforce (Blair, 1996; Blinder, 1990; Cappelli & Singh, 1992; Drake Prometric, 1995; Gerhart, Milkovich, & Murray, 1992; Huselid, 1995; Kochan, Dyer, & Batt, 1992; Mancall, Bashook, & Dockery, 1996; Mulkey, 1996; Pfeffer, 1994; Stasz, Ramsey, Eden, Melamid, & Kaganoff, 1996).

Many graduates lack the necessary knowledge and skills to be productive members of a workforce that focuses on high-performance/high-paying jobs. Lack of such skills in an entry-level workforce may be a major reason for potential economic noncompetitiveness.

An example of the changing nature of skills in banks and insurance companies has been provided by the Organisation for Economic Co-operation and Development (OECD). Old competencies consisted of ability to operate in a well-

defined and stable environment; capacity to deal with a repetitive, straightforward, and concrete work process; ability to operate in a supervised work environment; isolated work; and ability to operate within narrow geographical and time horizons. In contrast, new competencies consist of ability to operate in an ill-defined and ever-changing environment; capacity to deal with non-routine and abstract work processes; ability to handle decisions and responsibilities; group work and interactive work; and a comprehensive grasp of systems and ability to operate within expanding geographical and time horizons.

Another reality of the workplace is the increase in technology, which results in an increase in cognitive complexity. For example, instead of performing simple procedural and predictable tasks, a worker becomes responsible for inferences, diagnosis, judgment, and decision making, often under severe time pressure. Trends of increasing requirements of both knowledge and skills of workers coupled with an increase in technology in the workplace are made worse by the increased influence of international markets. In the future, one will compete worldwide or not at all. In summary, there is a potential skill gap for the high-skill, high-wage, high-productivity jobs.

The need of management for workers with greater skills and who can take on greater responsibility has spawned many commissions, task forces and studies. All of them have contributed to the vast evidence documenting the need for a more highly skilled workforce. However, what remains largely undone is the refinement of methods to assess the necessary skills that have been identified and the contextualization of such measures in an international setting.

What Are Competencies?

We view competencies in a skills context. The most promising intellectual framework to deal with these issues is provided by the Secretary's Commission on

Achieving Necessary Skills (SCANS) (U.S. Department of Labor, 1992). SCANS was charged in the U.S. with the task of examining the demands of tomorrow's workplace and the extent to which our young people entering the workforce are able to meet those demands. The target workplace was characterized as being high-skill, high-wage and high-performance. By "high performance" we mean work settings relentlessly committed to excellence, product quality, and customer satisfaction. Competencies were defined by SCANS as part of "workplace know-how" (U.S. Department of Labor, 1992, p. 6) or the skills that young people need to succeed in the world of work (see Figure 1). "High-performance workplaces also require competencies: The ability to manage resources, work amicably and productively with others, to acquire and use information, to master complex systems, and to work with a variety of technologies" (U.S. Department of Labor, 1991, p. xiii). Competent workers also need these following foundation skills: basic skills, thinking skills and personal qualities. The five SCANS competencies make the link between school and the workplace.

WORKPLACE KNOW-HOW

The know-how identified by SCANS is made up of five competencies and a three-part foundation of skills and personal qualities that are needed for solid job performance. These are:

WORKPLACE COMPETENCIES:—Effective workers can productively use:

- Resources— They know how to allocate time, money, materials, space, and staff.

- Interpersonal skills— They can work on teams, teach others, serve customers, lead, negotiate, and work well with people from culturally diverse backgrounds.

- Information— They can acquire and evaluate data, organize and maintain files, interpret and communicate, and use computers to process information.

- Systems— They understand social, organizational, and technological systems; they can monitor and correct performance; and they can design or improve systems.

- Technology— They can select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment.

FOUNDATION SKILLS:— Competent workers in the high-performance workplace need:

- Basic skills— Reading, writing, arithmetic and mathematics, speaking, and listening.

- Thinking skills— the ability to learn, to reason, to think creatively, to make decisions, and to solve problems.

- Personal qualities— individual responsibility, self-esteem and self-management, sociability, and integrity.

Figure 1. (From *Learning a Living: A Blueprint for High Performance.* The Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor, April 1992, p. 6.)

Review of Workforce Readiness Theoretical Frameworks

The purpose of this section is to identify and categorize workforce skills identified in five major studies synthesized by O'Neil, Allred, and Baker (in press-b). The five studies that were examined are described in the following reports: (a) *What Work Requires of Schools*, conducted by the Secretary's Commission of

Achieving Necessary Skills (SCANS) for the U.S. Department of Labor (U.S. Department of Labor, 1991); (b) *Workplace Basics: The Essential Skills Employers Want*, conducted by the American Society of Training and Development (ASTD) with the support of the Department of Labor (Carnevale, Gainer, & Meltzer, 1990); (c) the *Michigan Employability Skills Employer Survey*, conducted by the Michigan Employability Skills Task Force (Employability Skills Task Force, 1988, 1989; Mehrens, 1989); (d) *Basic and Expanded Basic Skills*, conducted by the New York State Education Department (1990); and (e) *High Schools and the Changing Workplace: The Employers' View*, conducted by the National Academy of Sciences (NAS) (1984).

In general, the five studies examined all began with a similar first step. Experts, generally educators, business people, scholars, and policy makers, were assembled to identify skills necessary for the workforce. The experts generated a framework of skills based on their own knowledge and experience, in addition to various informal investigations of the workforce and its requirements. All but the NAS study also included a second, validation phase. In this phase, employers and/or employees were asked how necessary each of the identified skills was for the world of work. The frameworks will be compared and summarized below.

Summary

Several commonalities in the findings of the five studies are apparent. Specifically, four major categories of job skills can be seen running through the five frameworks. First, each study identified the need for basic academic skills. These include the three R's as well as speaking and listening skills. Study participants judged job-related speaking and listening skills to be particularly important in both the Michigan and New York studies. Of the four common categories found, this one exhibited the greatest similarity across studies. This is

not surprising, given that the basic skills have received the most attention and elaboration in the past.

Second, all studies identified the need for higher order thinking skills. In general, these skills were deemed necessary because of the rapidity of change in the workforce. The most common higher order thinking skills identified can be seen as skills in adapting to these changes. Although the New York framework includes reasoning as an expanded basic skill, it clearly did not identify higher order thinking skills to the extent that the other studies did. In the SCANS, ASTD, Michigan and NAS studies, problem-solving skills were identified as important higher order thinking skills. In the SCANS and ASTD studies, learning how to learn was identified as an important higher order thinking skill. Indeed, for the ASTD study, it was identified as *the* foundation skill. The ability to learn was also identified as one of the three basic findings in the NAS study, although it is not identified in the framework of core competencies.

Third, within all five frameworks interpersonal and teamwork skills were judged to be essential. These skills have become important, the studies emphasize, because as responsibility is shifted further down the management hierarchy to groups of workers, the average worker needs to communicate and cooperate with other members of the organization to an increasing degree. Relative to the other major categories of skills identified, this category was identified as being especially important. On average, employers in the Michigan survey rated skills in working in groups and working with others between the "Critical" and "Highly Needed" points on the response scale. In the New York study, 84% of the jobs investigated were judged to require interpersonal skills at level 3 or higher, and 79% required team work skills at these levels.

Although all five studies identified interpersonal and team work skills and emphasized their importance, this category exhibited the greatest diversity in terms of the specific subskills that constitute it. It would seem that, at least at this point, these skills, although uniformly recognized as critical, are the most difficult to define and identify. Despite the differences, three common sets of subskills are apparent.

The single set of subskills in the interpersonal and teamwork skills category that all five studies identified were negotiation/conflict-resolution skills. Again, however, there was some diversity between the studies in how these skills were defined. The SCANS study defined negotiation skills as the ability to work toward agreements involving exchange of resources and resolution of divergent interests (see Table 1). ASTD reviewed definitions of negotiation skills found in the negotiation literature and emphasized the "principled" negotiation skills identified by Fisher and Ury (1981) (see Carnevale et al., 1990, pp. 330-350). The Michigan study operationalized negotiation skills simply as willingness to compromise (Mehrens, 1989, p. 10). Compromise is viewed quite differently in the negotiation literature from the notion of "resolving divergent interests" identified by SCANS (see O'Neil et al., in press-b, for a summary). The NAS study does not define negotiation/conflict-resolution skills except to state that it is necessary for workers to realize that conflict is inherent but can be handled through "constructive means" (National Academy of Sciences, 1984, p. 25). In the New York study, although negotiation and conflict resolution skills are not explicitly identified within the definition of interpersonal and team work skills, several aspects of conflict resolution skills are virtually the only examples of interpersonal skills offered for levels 5 and 6 of the interpersonal skills (New York State Education Department, 1990, pp. 45-46).

Table 1

Five Competencies

Resources: Identifies, organizes, plans, and allocates resources

    A. Time—Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules

    B. Money—Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives

    C. Material and Facilities—Acquires, stores, allocates, and uses materials or space efficiently

    D. Human Resources—Assesses skills and distributes work accordingly, evaluates performance and provides feedback

Interpersonal: Works with others

    A. Participates as Member of a Team—Contributes to group effort

    B. Teaches Others New Skills

    C. Serves Clients/Customers—Works to satisfy customers' expectations

    D. Exercises Leadership—Communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies

    E. Negotiates—Works toward agreements involving exchange of resources, resolves divergent interests

    F. Works with Diversity—Works well with men and women from diverse backgrounds

Information: Acquires and uses information

    A. Acquires and Evaluates Information

    B. Organizes and Maintains Information

    C. Interprets and Communicates Information

    D. Uses Computers to Process Information

Systems: Understands complex inter-relationships

    A. Understands Systems—Knows how social, organizational, and technological systems work and operates effectively in them

    B. Monitors and Corrects Performance—Distinguishes trends, predicts impacts on system operations, diagnoses deviations in systems' performance and corrects malfunctions

    C. Improves or Designs Systems—Suggests modifications to existing systems and develops new or alternative systems to improve performance

Technology: Works with a variety of technologies

    A. Selects Technology—Chooses procedures, tools or equipment, including computers and related technologies

    B. Applies Technology to Task—Understands overall intent and proper procedures for setup and operation of equipment

    C. Maintains and Troubleshoots Equipment—Prevents, identifies, or solves problems with equipment, including computers and other technologies

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From U.S. Department of Labor, 1991, p. 12.

Second, leadership skills were identified as a category of interpersonal and teamwork skills in three studies. The SCANS, ASTD and Michigan studies identified leadership skills as important, but again, there was substantial diversity in *how* these skills were defined and identified. The SCANS study spoke of persuasion. The ASTD study emphasized the skill of sharing leadership and reviewed a number of current theories of leadership (Carnevale et al., 1990, pp. 377-398). The Michigan study emphasized the skill of recognizing when to be a leader and when to be a follower.

Third, the ability to work with others from diverse backgrounds was a category of interpersonal and teamwork skills identified by four studies. The SCANS, Michigan, New York, and NAS studies identified skills in being sensitive and responsive to the ethnic, cultural and gender differences that exist between workers.

The fourth major category of workforce competency common to the five reviewed studies focused on personal characteristics and attitudes rather than particular skills. The important themes in this category were self-esteem, motivation, responsibility, and honesty. These types of worker qualities were generally rated as more critical than other workforce "skills" in the Michigan survey. Eighty-four percent of the jobs investigated in the New York study were also judged to require these personal work skills.

When persons (e.g., employees, graduates, or students) are asked to rate the relative importance of generic skills such as thinking or decision making, communications skills, and skills in cooperation and teamwork are rated the highest (Bikson & Law, 1994; Moore & Shaffer, 1985; National Board of Employment, Education and Training, 1992; Sinclair, in press; Stasz, Ramsey, Eden, Melamid, & Kaganoff, 1995, 1996). Further, the competencies required of

college graduates for high-performance/high-paying jobs also tend to be of the higher order thinking nature (e.g., Sinclair, in press). Thus, we believe that students work-bound may need to learn the same competencies whether in high school or in college. What differs is their expected performance levels.

In general, the most recent list of competencies can be found in the 1995 *Consensus Framework for Workplace Readiness* (Council of Chief State School Officers, 1995). However, what remains largely undone is the refinement of methods to assess the necessary skills that have been identified and, further, a survey of international workers so that the relative importance of such skills in different countries can be ascertained.

From these sets of competencies identified in the literature and suggested by policy makers, the Amsterdam meeting recommended that the following set of skills be considered for assessment internationally: interpersonal skills (e.g., teamwork), information competency, thinking skills (e.g., problem solving and metacognition), basic skills (e.g., oral and written comprehension) plus literacy. Subsequent discussions have indicated that computer administration of Life Skills measures is not feasible due to cost.

How Do You Assess Competencies?

The purpose of this section is to suggest various methodologies for the assessment of workforce competencies. The measurement issues to assess these skills are conceptualized as (a) what to measure (e.g., cognitive processes, tasks, or characteristics of jobs and the setting or context); (b) performance assessment approaches (e.g., portfolios or simulations); (c) criteria (e.g. validity, fairness, transfer, and generalizability, cost and efficiency); and (d) type of technology (e.g., paper-and-pencil, computer).

The assessment approaches suggested support the multiple purposes of testing, for example, diagnostic, selection, and accountability. Thus, such assessments would be either low or high stakes. The assessments could deal with either individual or team competencies. However, for the Life Skills Survey, the assessments will be considered to be for accountability purposes of a low-stakes nature for the individual involved and will assess both individual and team competencies.

Assessment Methodology

In order to create measures for competencies, one needs a methodology. We recommend the methodology in Table 2. This methodology is a revision of the one that was originally developed in an earlier report (O'Neil, Allred, & Baker, 1992a, in press-a). As shown in Table 2, that methodology dictates that in developing measures of workforce competencies, one begins with the selection of a workforce competency framework.

We recommend the selection/modification of the framework suggested by the Secretary's Commission on Achieving Necessary Skills (SCANS). SCANS was organized by the U.S. Secretary of Labor to determine what is required in tomorrow's workplace and to investigate the extent to which high school students would be able to meet those requirements. SCANS was originally chosen as a target system for our methodology for two reasons. First, the SCANS approach includes almost all the competencies we are interested in for our assessment approach (for example, SCANS was meant to be a national rather than a state or regional assessment). Second, we had a good, cooperative relationship with the SCANS staff (Arnold Packer and John Wirt).

Table 2

Workforce Competency Assessment Methodology for Life Skills Survey

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Select a life skills competency framework

Select competency

Conduct componential analysis of competency

Specify basic skills foundation

Create indicator(s) for subcompetencies

Classify indicator(s) within a cognitive science taxonomy

Create rapid prototypes of measures of indicator(s) via test specifications

Translate into target language(s)

Develop final measures of indicator(s)

Select experimental/analytical design

Run empirical studies

Analyze statistically

Report reliability/validity of indicator(s) measure

Create norms

Report on life skills competency using multiple indicators in multiple countries

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The methodology consists of a series of steps, from the initial selection of a life skills competency framework to the report documenting the process (Table 2). As seen in Table 2, a competency or skill is selected that is documented to be present in the work environment. Possible competencies would be basic skills (e.g., literacy) or interpersonal skills (e.g., participating as a member of a team), etc. Unfortunately, such molar categories do not map directly onto an assessment measure, and some further level of decomposition is required. Thus, the next step is implemented—that is, a componential analysis—in order to analyze the competency into its constituent subcompetencies. Next, indicators are created for the subcompetencies.

The indicators are then classified within a cognitive science taxonomy. The purpose of this step is to allow generalization of the findings from an indicator to a

high-order subcompetency within a theoretical framework. Then, measures of the competency are selected or developed in three steps: (a) rapid prototypes are developed and tested, (b) prototypes are translated into target language(s), and (c) prototypes are refined into final measures. Both process and outcomes are measured. Next, experimental/analytical designs are selected and empirical studies run. The data are statistically analyzed with a focus on psychometric issues (e.g., internal consistency, construct validity), and norms are created. A report on the reliability and validity of the indicator is written. Finally, a report on the assessment of the workforce competency using multiple indicators in multiple countries is written.

New Forms of Assessment

Now new kinds of assessments (Baker, O'Neil, & Linn, 1993; Linn, Baker, & Dunbar, 1991; O'Neil & Baker, 1994; O'Neil, Baker, Ni, Jacoby, & Swigger, 1994; Resnick & Resnick, 1992; Wiggins, 1989) are breaking away from multiple-choice tests, especially the strictures imposed by machine-scoring of student answers. These assessments are asking students to demonstrate and document their deep understanding of subject matter (Baker, Abedi, Linn, & Niemi, 1996; Baker, Freeman, & Clayton, 1991; Collis & Romberg, 1991; Herl, Baker, & Niemi, 1996; Shavelson, Baxter, & Pine, 1991) and their ability to solve complex problems (Baxter et al, 1993; Sugrue, 1993) and to work in groups or teams (O'Neil, Allred, & Dennis, 1993; Webb, 1993, in press-). These assessments are characterized by longer periods of engagement, multiple steps, and far different cognitive demands elicited from students (Baker, 1994). Common forms of assessments are exploration tasks and concept maps.

A set of standards or criteria for the validity of alternative assessments have been developed (Baker, O'Neil, & Linn, 1993; Linn, Baker, & Dunbar, 1991).

Included in them are criteria to be applied to a review of the assessment itself, such as cognitive complexity, meaningfulness, content quality, and linguistic appropriateness; and criteria inferred from results of assessments conducted under sets of specific conditions, such as transfer and generalizability, fairness, and instructional sensitivity.

These new forms of assessment are facilitated by the CRESST model of learning, Baker (1995). This model posits five families of cognitive learning: content understanding, collaboration, communication, problem solving, and metacognition. The five types describe the range of cognitive learning in which students engage; they are seen as working together to influence overall learning. By creating assessments that target each of these learning families, we can best evaluate an individual's learning.

One element of such an assessment is a concept mapping construction and scoring system. The concept map construction is a paper-and-pencil measure; the scoring is computer based. A concept map is a graphical representation of information consisting of nodes and labeled lines; nodes correspond to concepts within a particular subject area or domain, lines indicate a relationships between pairs of concepts (or nodes), and labels on each line explain how two concepts are related (refer to Jonassen, 1996; Jonassen, Beissner, & Yacci, 1993, for more in-depth coverage of concept mapping). Concept maps have typically been constructed using paper-and-pencil formats, such that the student draws the concept map. There is one major problem with current paper-and-pencil formats for constructing and scoring concept maps: i.e., the cost of scoring such maps. Much of this research on concept maps and assessment can be directly accessed through the CRESST Web site (http://www.cse.ucla.edu; or search for CRESST with any search engine).

Suggested Life Skills

A consensus developed at our Amsterdam meeting that the following life skills merited more analytic attention as they were good candidates for the survey. The life skills were teamwork, problem solving, metacognition, oral communication, writing communication, motivation, a replication of some of the prior literacy survey, and information technology. The following life skills are not listed in any order of priority.

Teamwork

Theoretical framework for teamwork skills. One is interested in the nature of the interaction between team members, and how that interaction influences team performance on a particular task. Salas, Dickinson, Converse, and Tannenbaum (1992) and Cannon-Bowers and Salas (in press) provide some useful theoretical insight to the above issue. In their work, Salas et al. (1992) have characterized teams in terms of two kinds of skills: taskwork skills and teamwork skills. Taskwork team skills influence how well a team performs on a particular task (e.g., whether a group of students will develop a sophisticated concept map). Teamwork skills, or team process skills, influence how effective an individual member will be as part of a team.

We have developed a taxonomy of teamwork process measures in prior work (O'Neil, Allred, & Dennis, in press). Teamwork skills are defined as team process skills that influence how effective an individual member will be as part of a team. They are domain independent and are assumed to be present in all teams in varying degrees (e.g., leadership). The taxonomy is made up of six teamwork processes: (a) adaptability—recognizing problems and responding appropriately, (b) communication—the exchange of clear and accurate information, (c) coordination—organizing team activities to complete a task on time, (d) decision-

making—using available information to make decisions, (e) interpersonal—interacting cooperatively with other team members, and (f) leadership—providing structure and direction for the team.

Measurement of teamwork skills. Existing approaches to measuring teamwork skills rely almost exclusively on observational methods (Baker & Salas, 1992) For example, behavioral checklists (e.g., Oser, McCallum, Salas, & Morgan, 1989), videotaped and audiotaped observations (e.g., Brannick, Roach, & Salas, E., 1993), and analysis of think-aloud protocols are the most common techniques to measure teamwork processes. These methods are labor intensive and time consuming. Observations must be transcribed, coded, and analyzed post hoc. Such techniques offer no opportunity for rapid analysis and reporting of team skills. From an assessment perspective, these methods are unappealing because of the lag between test administration and reporting of test results. Further, these methods are neither practical nor cost effective in large-scale test settings. So, a critical measure remains unresolved: How do we measure teamwork process such that the measurement technique is reliable, valid, and timely? There seem to be two options: a computer-based environment (not feasible in the Life Skills Survey) or self-report measures of teamwork skills via paper-and-pencil survey techniques.

Information Competency

Theoretical framework for the information or information technology competency. One of the five competencies that SCANS identified as necessary for productive performance in the workforce. This SCANS competency has much in common with the discussion on information technology at the Amsterdam meeting.

Based upon the SCANS commission's discussions and meetings with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores, the SCANS commission found that the ability to productively use information is critical to productivity in the workforce. Technological advances have both increased dramatically the amount of information generated and made this information potentially more accessible. This explosion in the amount of information, along with the rapidity of change in today's workplace, has contributed to a heightened need for the efficient use of information. Accordingly, the SCANS commission elaborated the cognitive requirements for the information competency of the workforce as follows (U.S. Department of Labor, 1991, pp. B1-B2).

Acquires and evaluates information. Identifies need for data, obtains it from existing sources or creates it, and evaluates its relevance and accuracy.

Organizes and maintains information. Organizes, processes, and maintains written or computerized records and other forms of information in a systematic fashion.

Interprets and communicates information. Selects and analyzes information and communicates the results to others using oral, written, graphic, pictorial, or multi-media methods.

Uses computers to process information. Employs computers to acquire, organize, analyze, and communicate information.

Interpersonal Competency

Theoretical framework for the interpersonal competency. One of the five competencies the Commission identified as critical to productive performance in the workforce is interpersonal skills.

In elaborating the cognitive requirements of the interpersonal competency, the Commission defined the following six subcompetencies (U.S. Department of Labor, 1991, p. B1):

Participates as a member of a team. Works cooperatively with others and contributes to group with ideas, suggestions, and effort.

Teaches others. Helps others learn.

Serves clients/customers. Works and communicates with clients and customers to satisfy their expectations.

Exercises leadership. Communicates thoughts, feelings, and ideas to justify a position; encourages, persuades, convinces, or otherwise motivates an individual or groups, including responsibly challenging existing procedures, policies, or authority.

Negotiates. Works towards an agreement that may involve exchanging specific resources or resolving divergent interests.

Works with cultural diversity. Works well with men and women and with a variety of ethnic, social, or educational backgrounds.

The identification of the interpersonal competency as critical resulted in part from the Commission's finding that a trend exists toward organizing workers in terms of teams and toward decision making closer to the front line (U.S. Department of Labor, 1991, pp. 3-4).

The Commission's findings that, to be competitive, America needs to organize its workforce in terms of teams that take on problem-solving and decision-making responsibilities formerly left to managers further up the management hierarchy are confirmed by other commissions and task forces examining the skills demands of America's workforce (e.g., Employability Skills

Task Force, 1989; National Center on Education and the Economy, 1990; Packer & Pines, 1996). However, as more tasks and responsibilities are shared and fulfilled cooperatively by several persons rather than by individuals acting alone, the potential for interpersonal friction increases and it is reduced by negotiation.

Theoretical framework for negotiation subcompetency. Researchers have examined the cognitive indicators of a number of interpersonal competencies that the Commission found critical to productivity in the workforce. Specifically, the cognitive indicators of the "negotiates" subcompetency, which is defined (U.S. Department of Labor, 1991, p. B1) as the ability to work towards an agreement that may involve exchanging specific resources or resolving divergent interests, are examined in the research on integrative negotiation skills (e.g., Komorita & Parks, 1995; Lewicki, Litterer, Minton, & Saunders, 1994; Womack, 1990).

The research on integrative negotiation skills provides clear documentation of cognitive indicators of important aspects of the interpersonal competency identified by the Commission. This stream of research identifies the cognitive indicators of the negotiation subcompetency, which is the ability to negotiate an agreement involving exchanges of specific resources or resolving divergent interests. Integrative negotiation skills also serve as cognitive indicators of the "participates as a member of a team" and "exercises leadership" interpersonal subcompetencies as well as the creative thinking, decision-making, and problem-solving skills.

Measurement of the negotiation subcompetency. In developing this measure, we followed the general methodology for the development of workforce measures elaborated in Table 2.

The SCANS study defined *negotiate* as working towards an agreement that may involve exchanging specific resources or resolving divergent interests (U.S.

Department of Labor, 1991, p. 31). The SCANS analysis further elaborated that the negotiation skills necessary for workforce performance are (a) researching opposition and the history of the conflict, (b) setting realistic and attainable goals, (c) presenting facts and arguments, (d) listening to and reflecting on what has been said, (e) clarifying problems and resolving conflicts, (f) adjusting quickly to new facts/ideas, (g) proposing and examining possible options, and (h) making reasonable compromises (U.S. Department of Labor, 1992, pp. 2-37). Of those eight negotiation skills, we recommend focusing on measuring (g) proposing and examining possible options and (h) making reasonable compromises as the key terminal behaviors. Because setting realistic and attainable goals, presenting facts and arguments, listening to and reflecting on what has been said, clarifying problems and resolving conflicts, and adjusting quickly to new facts/ideas are seen as prerequisites to these terminal behaviors, they are indirectly measured by our assessment. Our measurement environment in simulation (discussed below) did not assess researching opposition and the history of the conflict.

With regard to the SCANS performance criteria, we needed to simulate the activities of proposing and examining options and making reasonable compromises, and the exchange of proposals and counterproposals. With regard to the cognitive indicators identified in the negotiation literature, the exchange of proposals should take place in the context of a situation of mixed-motive interdependence, with both distributive and integrative dimensions. We implemented this strategy in the context of a computer simulation (see O'Neil, Allred, & Dennis, in press, for additional detail).

Problem-Solving Skills Competency

Theoretical framework for problem-solving skills. Our theoretical frameworks are twofold: A CRESST model of learning, and a specific model of

problem solving. The CRESST model includes five families of cognitive learning of which problem solving is one (Baker, 1995). Problem solving is a cognitive process directed at achieving a goal when a solution method is not obvious to the problem solver (Mayer & Wittrock, 1996, p. 3).

The CRESST model of problem solving is adapted from the problem-solving models of Glaser, Raghavan, and Baxter (1992), and Sugrue (1995). It includes four elements: (a) content understanding, (b) metacognition, (c) motivation (self efficacy, effort, and anxiety), and (d) domain-specific problem-solving strategies (e.g., search strategies).

Measurement of the problem-solving skills competency. Currently, the ideal assessment of problem solving is based on think-aloud protocols or performance assessments that require extensive human rater scoring or less desirable multiple-choice tests. All of the current assessments (except multiple-choice) are expensive and time consuming and result in delayed (up to months/years) reporting to parents, children, and teachers. All current methods provide challenges for reliability and validity. One approach is to computerize the administration, scoring, and interpretation of problem solving, thus facilitating timely reporting and potentially increasing reliability and validity. Unfortunately, such a computer approach is not feasible for the Life Skills Survey.

In general, elements of problem-solving skills are scored separately and should be reported as a profile of problem solving. We believe that content understanding and problem-solving strategies are best assessed domain-specifically whereas metacognition and motivation are best assessed as domain-independent constructs. However, we realize that all domain-independent constructs need to be instantiated in a particular domain. We have also created

measure of metacognition (O'Neil & Abedi, 1996) and motivation (self-efficacy (Malpass, 1994), and effort (Huang, 1996).

One way to assess students' problem-solving skills is by having them search for information on concepts they are uncertain of so as to improve their content understanding (Kuhlthau, 1993). The search process is basically beginning with an ill-defined problem with no obvious solution, selecting topics to pursue, and exploring general information, then formulating a focused search based on the information found during exploration, collecting relevant information, and completing the search and resolving the problem -- that is, finding answers or solutions to meet an information need, or integrating the relevant information into an existing knowledge base.

Metacognition Competency

Theoretical framework for the metacognition competency. Pintrich and DeGroot (1990) suggested that metacognition consists of strategies for planning, monitoring and modifying one's cognitions. Metacognition can also be viewed as consisting of planning, monitoring, cognitive strategies and awareness (O'Neil & Abedi, 1996). O'Neil and Abedi (1996) view metacognition as composed of awareness, planning, monitoring or self-checking, and cognitive strategies. They have added the construct of awareness as they believe there is no metacognition without being consciously aware of it (see also Flavell, 1979). Further, in contrast to existing measures of metacognition, they view these constructs from both a cognitive science perspective (e.g., Barsalou, 1992; Beyer, 1988; Hayes-Roth, 1988) and a state-trait perspective (e.g., Spielberger, 1975). Traits are considered relatively enduring predispositions or characteristics of people (e.g., intelligence or aptitude). Trait metacognition is defined as a relatively stable individual difference variable to respond to intellectual situations with varying degrees of

state metacognition. The trait measurement of metacognition is recommended for this Life Skills Survey.

In summary, O'Neil and Abedi (1996) define metacognition as the conscious and periodic self-checking of whether one's goal is achieved and, when necessary, selecting and applying different strategies. One is self-aware of the process in the following ways. Planning: One must have a goal (either assigned or self-directed) and a plan to achieve the goal. Self-monitoring: One needs a self-checking mechanism to monitor goal achievement. Cognitive strategy: One must have a cognitive or affective strategy to monitor either domain-independent or domain-dependent intellectual activity (for example, finding the main idea is a domain-dependent cognitive strategy). Awareness: The process is conscious to the individual.

Measurement of the metacognition competency. The techniques for measuring metacognition in empirical studies may be categorized into two kinds: domain-dependent and domain-independent. One of the major domain-dependent methodologies is think-aloud protocol analysis. In this technique, a subject is asked to vocalize his or her thinking processes while he or she is working on a problem. The data as a protocol are then coded according to a specified model for psychological analysis, which provides insights into elements, patterns, and sequencing of underlying thought processes. An excellent review of mainly domain-dependent metacognitive assessment techniques including protocol analysis is provided by Royer, Cisero, and Carlo (1993). Another interesting domain-dependent technique in reading is provided by Everson et al. (1994).

There are several interesting domain-independent measures of cognitive and affective processes (see, for example, Pintrich & DeGroot, 1990) to measure

metacognition. These investigators use rating scales (*Motivational Strategies for Learning Questionnaire (MSLQ)*) to measure metacognition. This type of measurement involves asking participants to answer or self-report on statements about cognitive or affective processes. However, this scale does not explicitly address either the state-trait distinction or specific metacognitive constructs, which we believe are critical in the measurement of metacognition. Thus, if a domain-independent trait metacognitive scale is desired, we recommend the Trait Metacognitive Scale. This scale has been informed by the other research on the measurement of metacognition. (Borkowski & Muthukrishna, 1992; Everson, Smodlaka & Tobias, 1994; Paris, Cross, & Lipson, 1984; Pintrich & DeGroot, 1990; Pressley & Afflerbach, 1995; Tobias & Everson, 1995; Zimmerman, 1989; Zimmerman & Martinez-Pons, 1986, 1990, 1988). The following items are examples of trait metacognitive items. Planning: *I try to understand the task before I attempted to solve it*; Self-checking: *I check my work while I am doing it*; Cognitive strategy: *I use multiple thinking techniques or strategies to solve a task*; Awareness: *I am aware of my ongoing thinking processes.*

Motivation

Theoretical framework for motivation. Weiner (1992) suggests a broad definition of motivation, that is: "why human and subhuman organisms think and behave as they do" (p. 1). As is true for most fields, there is no complete theory of motivation and thus no measures of motivation per se. There are only mini-theories that attempt to explain and predict subsets of motivational phenomena (see Stipek, 1996). The dominant mini-theories of motivation are attribution theory (Graham & Weiner, 1996; Weiner, 1992), self-efficacy theory (Bandura, 1986, 1993), goal setting theory (Locke & Latham, 1994). In each of these theories, effort is a major causal variable.

According to Weiner, people seek to understand why they succeed or fail. This knowledge then allows prediction of subsequent events and thus the level of effort to expend. Their accomplishments or loses are attributable to a variety of antecedent factors that can be classified as locus of causality (internal or external), stability (stable or unstable) and controllability or responsibility (uncontrollable, controllable). Luck as an attribute of success would be external, unstable, and uncontrollable, whereas effort would be internal, stable or unstable, and controllable.

Bandura (1986), defined self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance" (p. 391). Implicitly, self-efficacy refers to people's specific beliefs about their capability to perform certain actions or to bring about intended outcomes in a domain or to otherwise exert control over their lives (Bandura, 1986, 1993; Boekaerts, 1992; Schunk, 1990). Collins (1985) and Pintrich and Schrauben (1992) noted that more efficacious students monitored their performance and applied more effort than students who were low in self-efficacy. Bandura (1993) said that people with high self-efficacy ". . . heighten and sustain their efforts in the face of failure. They attribute failure to insufficient effort or deficient knowledge and skills that are acquirable" (p. 144).

Research has repeatedly shown that high test anxiety is associated with low cognitive performance (Hembree, 1988, 1990). Anxiety may be differentiated into two components: worry (cognitive), and emotionality (physiological/ affective), Hembree, 1988; O'Neil & Fukumura, 1992). In several studies, worry has had a stronger negative correlation with performance than emotionality, suggesting that worry be measured only and that emotionality need not be measured if there are time constraints.

Measurement of motivation. All of the above theoretical constructs—trait effort, trait self-efficacy, goal setting, and trait worry—are assessed by self-reported measures augmented by behavioral measures.

Summary

In summary, we recommend that the Life Skills Survey should be characterized in the following montage of factors: (a) a focus on the assessment of competencies; (b) a focus on collaborative competencies as well as individual competencies; (c) contexts in the workplace, home and community; (d) a focus on the world of work as well as the transition to the world of work (e.g., from high school or college); (e) use of a modified version of the SCANS framework as its conceptual model of the competencies needed for this world of work; (f) use of a range of intellectual frameworks; (g) use of a broad variety of methodological approaches from qualitative to quantitative (structural equation modeling); (h) multidisciplinary; and (i) multinational.

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