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ABSTRACT

What has been learned from the study of relationships between abilities and outcomes learned in college and those abilities as they are performed at work is summarized to infer principles that should inform a national system to assess the higher order thinking and communications skills of college graduates in support of the National Education Goal of Literacy and Adult Learning. It is argued that abilities can be assessed in ways that connect education and work as long as abilities are defined in ways that make sense to both spheres. Abilities can be assessed in ways that enable judgments of graduates' effectiveness and in ways that help determine the effectiveness of college learning for work. It will be necessary to identify the abilities involved in effective work and citizenship, but this information can be collected directly from college graduates in work and service roles. Accountability and improvement agenda can be met in the same system. Seven figures illustrate the discussion, and a 101-item list of references is included. Seven appendices provide specific information about the assessment approaches of Alverno College in Milwaukee (Wisconsin). Reviews by R. L. Larson, T. Marchese and B. Wright, and R. G. Swanson of this position paper are provided. The author's response is included. (SLD)

# DESIGNING A NATIONAL ASSESSMENT SYSTEM: ASSESSING ABILITIES THAT CONNECT EDUCATION AND WORK

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# DESIGNING A NATIONAL ASSESSMENT SYSTEM: ASSESSING ABILITIES THAT CONNECT EDUCATION AND WORK

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## ABSTRACT

The purpose of this paper is to summarize what we have learned from our study of relationships between abilities/outcomes learned in college and those abilities as they are performed at work. From these experiences and findings, we infer principles that should inform a national assessment system. Further, we draw implications, questions and issues that need to be considered if the recommendations we make for a national assessment system are to be realized. This paper contributes to the larger purpose of developing a process to assess higher order thinking and communication skills of college graduates in support of the National Goal of Literacy and Adult Learning. The over-riding concern is that benefits accrue directly for faculty and students, employers and employees, and indirectly for policy makers in the public and private sector, as well as the public at large.

This paper deals with issues of what to assess, and how to assess abilities that link education and work. While the primary interest in and locus for assessment is with the college student, upon entry, during college, and at graduation, the consequent questions that arise from this information will immediately redirect the public interest to how college learned abilities connect to work and citizenship.

This paper argues that abilities can be assessed in ways that connect education and work, provided that abilities are defined in ways that make sense to both educators and students, employers and employees. Abilities that are defined with multiple components, as integrated, developmental and transferable, can be assessed within appropriate roles and contexts. Thinking critically, communicating effectively, and solving problems are abilities common to college education and work. Effective performance at work is made up both of intellectual and interpersonal abilities; thus, performance that integrates interpersonal and intellectual abilities should be assessed. Those abilities that enable education-work relationships, that is, that enable the transfer of learning from college to work and from work to further learning need to be assessed as well; one example is learning to learn or self-sustained learning.

Further, this paper argues that abilities can be assessed in ways that enable judgments of graduates' effectiveness, and in ways that help determine the effectiveness of college learning for work. We will need to identify abilities involved in "effective" work and citizenship roles, but information can be collected directly from college graduates in work and service roles. When abilities are defined and assessed in ways that connect education and work, then faculty and students, employers and employees can use the information both to improve instruction or training, respectively, and to determine how they are meeting their own and others' expectations for learning outcomes and for work performance. Both an accountability and improvement agenda should be met within the same system.

The discussion of the above issues moves from *principles learned* from our research, that ultimately lead to a series of *recommendations*, followed by *implications, issues and questions*. A map that guides the reader throughout is Figure 1, pp. 4-6. These recommendations set forth essential components, principles, and strategies for a national assessment system that ultimately would contribute to the improvement of both higher education and life after graduation for the American citizen at work and in other roles in society.

# DESIGNING A NATIONAL ASSESSMENT SYSTEM: ASSESSING ABILITIES THAT CONNECT EDUCATION AND WORK[1]

## INTRODUCTION

### Assumptions Underlying this Paper

There are several assumptions underlying this paper. First, we assume that the context for relating education and work includes before, during and after college. College population demographics show that the majority of college students no longer consist of 18-year-olds who begin college directly from high school, complete their education in four years, and then either go on to graduate school or enter the workforce. Rather, college students are likely to be from a broad age range, with a heterogeneous work experience. Many combine college with full-time or part-time employment; our own students work before, during, and after college. Further, many postsecondary programs in technical schools, community colleges, and liberal arts colleges who prepare students for professional careers have well-developed internship and field experience programs that call for assessment of student performance in field settings.

Second, as workplace demands become more complex, employers and the professions are putting more and more resources into education, training, and continuing education programs. Educators in corporations and the professions are expecting more support in this effort from colleges and universities. Thus, more persons will be in college across their lifespan. With so many college students working before, during, and after college, and so many workers requiring more learning opportunities, we need to see college learning in the context of work, and work in the context of college and other kinds of work-related learning. While this paper often uses language implying that transfer "from college to work" is the only interest, we assume that work influences college as much as college influences work.

A third assumption is that college and university students and faculty, as well as employers and employees in business, community organizations, and the professions, are joined together in a mutual enterprise. All these persons are invested to some degree in improving learning opportunities at college and in the workplace. They have a common interest in assessing abilities that prepare one for twenty-first century demands. These abilities and demands include participating in a global economy and global citizenship. The assumption is that a national assessment system can call on and count on this common interest.

A fourth assumption is that workplace and citizenship demands are becoming so complex that, contrary to past perceptions, college is now a place where students are learning abilities that will be important for day-to-day work as well as for personal or leadership goals. The kinds of complex thinking, communication, and problem solving skills learned in college are in great demand in the workplace as well as one's personal life. Interpersonal abilities, leadership qualities, and self-directed learning skills are essential across all of these situations, particularly as business and industry moves to more of a "total quality management" environment (DeWitt, 1991).

Fifth, both college faculty and employers have a joint interest in individuals meeting expectations for citizenship, and they assume that abilities developed in college and performed at work are ones that transfer to

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[1] This paper was written in relationship to another paper commissioned by NCES in order to enable the authors to focus on two separate areas identified by the Center, and at the same time to maximize the space allotted and to respect our readers' patience. In collaborating in writing the papers, we aimed to establish logical relationships among the principles, recommendations, issues, and questions we set forth for a national assessment system. This paper's companion piece, "Developing a National Assessment System: Alverno's Institutional Perspective," by Georgine Loacker, sets context for this one, and should, if possible, be read first (although the papers can be read independently). Many of the principles learned and consequent recommendations in this paper assume those developed in Loacker's paper. Further, this paper has been framed, in part, within the context of Alverno's ability-based, performance-assessment curriculum. It is best understood with that context in mind.

service and citizenship roles. Information from assessment can assist both faculty and employers to determine the degree to which graduates and employees are meeting their own expectations, those of faculty and employers, and of those roles outside of work.

A sixth assumption is that any national assessment system will consider that abilities, assessed in context, will change, because the demands for performance and the contexts in which abilities are performed, will change.

A seventh assumption is that the primary interest in and locus for assessment is with the college student, upon entry, during college, and at graduation. Likewise, we assume, that information from assessments of college learning outcomes at graduation will leave unanswered the question that students, educators, employers and policymakers are often most interested in: "Does college learning transfer to work and service, and does college prepare individuals not only for entry level positions and beginning roles, but also for future positions and roles, which may be as yet undefined or unimagined? How do we know which abilities last a lifetime, which are needed for the twenty-first century, and which of these should be developed during college?" Thus, a national assessment system should assess and research how abilities are actually performed in the workplace to respond to societal expectations that higher education is to some degree responsible not only for immediate but future application of college-learned abilities, and to respond to higher education's expectations that one cannot prepare students adequately unless one can to some degree project future needs. Thus, while the primary investment is in the assessment of the college student, the consequent questions that arise from this information will immediately redirect the interest to how college learned abilities connect to work and citizenship afterward.

Assumptions eight and nine relate to a national assessment system. We assume that readers accept the idea of a national assessment system rather than a single national test, and that they are persons in the process of considering what it means to assess the abilities of students during and after college.

Finally, this paper shares an assumption with that of other papers commissioned for this project. Each author is commissioned to widen the lens, to review all the elements we believe should be part of a national assessment system. While we should identify implications, issues, and questions that flow from our recommendations, we should not prematurely impose limitations or feasibility criteria that could limit either a national vision or a set of national opportunities. Explicit concern for all the difficulties of implementation is set aside in favor of broadening the scope and potential of a national assessment system.

## Purpose

The purpose of this paper is to examine whether abilities taught, learned, and assessed in college can form the basis for effective performance after college. If the conclusion is positive, then a national assessment system should measure how college graduates are performing those abilities that make for effective performance in work and citizenship roles afterward.

## Issues that Frame this Paper

### What Abilities/Outcomes Should be Assessed?

The first of several broad issues that frame this paper is, "What abilities/outcomes should be assessed?" Can we clarify common elements of abilities identified in the national goals both in college and work? At least two conditions determine whether we can agree on these abilities as college educators and employers. One is the extent to which a national assessment system can gradually demonstrate that these college-learned abilities are linked to effective performance in the world of work. Another is the possibility of defining the abilities through assessment criteria so that, while they transfer across contexts, they are assessed in context.

### How Should Abilities be Defined?

A related issue is "How should abilities be defined?" A significant section of this paper deals with this issue because definition is critical. It helps us judge whether additional abilities should be incorporated into those identified as national goals. Further, some abilities to enable transfer to the world of work may have to be learned in college.

### Are Abilities Learned in College?

A third issue is whether we can demonstrate that these abilities are learned in college as a result of the curriculum. This paper deals with this issue in relation to the arguments and evidence provided in its companion commissioned paper (Loacker, 1991) (See Footnote 1). In both papers, various educational assumptions underlie how abilities are defined. While the research reported is considered neither definitive nor representative of the field, evidence is cited primarily on Alverno graduates because they experienced an ability-based curriculum, including performance assessment, and we have research evidence linking student changes in abilities to this curriculum. Thus Alverno graduates' performance at work is of interest <u>because</u> we have evidence that they learned some of these abilities in college. The direct links between graduate performance at graduation and five years later is still under investigation in the Alverno longitudinal study.

### How and When Should We Assess?

A fourth issue is how and when to assess for these abilities. These abilities should be assessed before, during, and at the endpoint of the college experience. Ideally, a complete national assessment system would also assess for these abilities after college in the workplace for two reasons. First, educators and policymakers are interested to see if graduates who learned these abilities in college are performing effectively in a competitive workforce and, as citizens, in society in general. Second, the study of graduates' abilities in the workplace and in service roles can illuminate the definitions of abilities that should form the basis for what is taught and assessed in college, and so contribute to higher education's ability to connect education and work.

## WHAT HAVE WE LEARNED?

We discuss these issues by identifying what we have learned from a series of studies that examine relationships between college outcomes and work. Our followup research, assessing both our graduates' performance of work and the performance of outstanding professionals who are not our graduates, supports our conclusions about what abilities to assess and how to assess for them in college students. From our findings, we make recommendations for the design of a national assessment system. Throughout, we identify implications, issues, and questions that flow from recommendations for designing a national assessment system that can assess abilities learned in college and that transfer to work and citizenship. Following is a complete list of "What Have We Learned" statements. Each is discussed in turn, with *recommendations* made for designing a national assessment system, and consequent *implications, issues, and questions* (See Figure 1).

1. Abilities can be defined in ways that connect education and work. These can be assessed within professional roles in appropriate contexts, as well as in college, in order to achieve both accountability and improvement.

2. Abilities defined as having multiple components, and as integrated, developmental and transferable, are likely to make sense both to educators and employers.

3. Thinking critically, communicating effectively and solving problems are abilities common to college education and work. Effective performance at work is integrated; it is made up both of intellectual and interpersonal abilities.

4. To effectively transfer college-learned abilities, students need to develop learning to learn skills, or self-sustained learning. Assessment that incorporates feedback and opportunities to self-assess fosters self-sustained learning.

5. Comparing faculty-defined abilities to those demonstrated by outstanding professionals enables faculty to identify abilities students need for particular professions.

6. Complex abilities that connect education and work—including self-sustained learning—can be assessed in graduates' work performance in a variety of professional contexts. Some abilities can be linked to college learning, and some distinguish effective performance at work.

7. Faculty, professionals, and employers will invest in understanding the relationship between education and work if they can create contextually rich descriptions of performance in relation to their judgment of what abilities to develop.

## Using the Map

We suggest using Figure 1 on pages 6, 7 and 8 as a "map" to assist in navigating the following text.

**Figure 1. Designing a National Assessment System: Assessing Abilities That Connect Education and Work**

| WHAT HAVE WE LEARNED? | RECOMMENDATIONS | IMPLICATIONS | ISSUES AND QUESTIONS |
|---|---|---|---|
| 1. Abilities can be defined in ways that connect education and work. These can be assessed within professional roles in appropriate contexts, as well as in college, in order to achieve both accountability and improvement. | 1. A national assessment system should assess for abilities that connect education and work. These should be assessed on the job within appropriate contexts, as well as in the college setting. | 1. Some abilities assessed by educators in college and employers at work will not be measured by a national assessment system that looks at graduates' performance on the job.<br>1. Assessment techniques may differ in education and work contexts, but common abilities could cross both. | 1. What abilities should be assessed?<br>1. What abilities are learned in college and performed at work? |
| 2. Abilities defined as having multiple components, and as integrated, developmental and transferable, are likely to make sense both to educators and employers. | 2. A national assessment system should define abilities as having multiple components, and as integrated, developmental and transferable, so they make sense to educators and employers. | 2. Assessments will measure cognitive and affective, knowledge and ability components simultaneously.<br>2. Measuring changes in abilities from college to post-college may call for qualitative measurement and nonadditive, nonlinear change models | 2. How are abilities best defined?<br>2. What does it mean to assess both cognitive and affective components simultaneously?<br>2. How do we assess content and abilities, knowledge as well as performance?<br>2. How define construct validity when abilities are multidimensional rather than unitary constructs?<br>2. What is "good" evidence?<br>2. What is the developmental sequence of abilities?<br>2. Do abilities become integrated in performance?<br>2. How measure changes in abilities after college?<br>2. How define reliability when we assume change rather than consistency?<br>2. Can all outcomes be specified? |
| 3. Thinking critically, communicating effectively and solving problems are abilities common to college education and work. Effective performance at work is integrated; it is made up both of intellectual and interpersonal abilities. | 3. A national assessment system should assess for abilities already identified in the national goals and should provide for performances that integrate intellectual and interpersonal abilities. | 3. Assessments will measure intellectual and interpersonal abilities. | 3. What does it mean to assess intellectual and interpersonal abilities simultaneously?<br>3. How assess integrated performance? |

**Figure 1 (continued). Designing a National Assessment System: Assessing Abilities That Connect Education and Work**

| WHAT HAVE WE LEARNED? | RECOMMENDATIONS | IMPLICATIONS | ISSUES AND QUESTIONS |
|---|---|---|---|
| 4. To effectively transfer college-learned abilities, students need to develop learning to learn skills, or self-sustained learning. Assessment that incorporates feedback and opportunities to self-assess fosters self-sustained learning. | 4. A national assessment system should assess self-sustained learning and should include feedback and opportunities to self-assess. | 4. Measures will include open-ended, indepth, interactive, sustained interviews of graduates' perspectives. | 4. How assess self-sustained learning? Is it feasible?<br>4. How assess for integrated performance?<br>4. How give feedback and opportunities to self-assess? |
| 5. Comparing faculty-defined abilities to those demonstrated by outstanding professionals enables faculty to identify abilities students need for particular professions. | 5. The method that some educational institutions and consulting firms use to measure abilities in the workplace to improve student and employee performance can be used as a strategy in a national assessment system. | 5. This method could be used to assess abilities after college in context, as well as for identifying abilities. | 5. Can the method assess abilities in college and at work?<br>5. How sample faculty/institutions to build the research base for creating abilities?<br>5. How feasible is it to follow graduates after college?<br>5. How feasible is it to assess for graduates' performance at work?<br>5. What are the barriers to using information about graduate's performance at work back on campus?<br>5. How can performance at work be linked to college instruction?<br>5. How assess for performance-in-context? |

**Figure 1 (continued). Designing a National Assessment System: Assessing Abilities That Connect Education and Work**

| WHAT HAVE WE LEARNED? | RECOMMENDATIONS | IMPLICATIONS | ISSUES AND QUESTIONS |
|---|---|---|---|
| 6. Complex abilities that connect education and work–including self-sustained learning–can be assessed in graduates' work performance in a variety of professional contexts. Some abilities can be linked to college learning, and some distinguish effective performance at work. | 6. A national assessment system should sample graduates' performance at work and in citizenship roles, as well as in college, and judge performance in relation to those developmental criteria that distinguish effective performance. | 6. Institutions, employers, and alumnae will need to work together to design and develop appropriate strategies for sampling performance through work samples, portfolios, behavioral event interviews, critical incident techniques, or other assessment technologies already in place at work.<br><br>6. We will need to identify abilities involved in "effective" work and citizenship roles, but information can be collected directly from college graduates at work and in service. | 6. How assess integrated performance?<br><br>6. How assess performance-in-context?<br><br>6. How account for differences in work settings and in professional roles?<br><br>6. How use expert judgment to code abilities in performance?<br><br>6. How validate expert judgment of complex, integrated performance?<br><br>6. How judge effectiveness?<br><br>6. How make assessment cost effective? What are legal issues involved in performance samples of employees for post-college studies? |
| 7. Faculty, professionals, and employers will invest in understanding the relationship between education and work if they can create contextually rich descriptions of performance in relation to their judgment of what abilities to develop. | 7. Faculty, employers, and public representatives should be involved in making judgments about the abilities essential to effective post-college performance at work and in citizenship roles. | 7. Creating a context for participation is as important as developing assessment techniques. | 7. How assess for what employers and the public really want to see: Personal maturity, leadership, ethical decision-making, integrated performance? |

Principle Learned #1. Abilities can be defined in ways that connect education and work. These can be assessed within professional roles in appropriate contexts, as well as in college, in order to achieve both accountability and improvement.

Abilities identified in the national goals have elements that appear in studies linking abilities learned and assessed in college with those demonstrated at work. Those abilities that do connect can be assessed both in college to measure the outcomes of college learning and in the workplace to demonstrate accountability and to improve definitions of abilities back on campus.

Figure 2 illustrates an example of abilities that connect college and work drawn from National Goal #5 and Alverno research. Figure 2 also means to convey that academic-specific knowledge, procedures, and abilities contribute to performance of abilities in college. Further, context and/or task-specific knowledge, procedures, and orientations contribute to the way abilities are performed at work.

Figure 2. Assess Abilities that Connect Education and Work.

| COLLEGE ONLY | ABILITIES THAT CONNECT COLLEGE AND WORK | WORK ONLY |
|---|---|---|
| | • Think critically<br>• Communicate effectively<br>• Solve problems<br>• Use interpersonal abilities<br>• Use self-sustained learning | |
| Assess abilities using performance assessment, portfolios, performance interviews | Assess abilities using performance interviews, portfolios, etc. | Assess abilities using work samples, performance appraisals, assessment center method |
| ↑<br>Academic–specific knowledge, procedures, orientations | | ↑<br>Work-specific knowledge, procedures, orientations |

A variety of performance assessment methods can be used both in college and at work. For instance, there are examples of the use of an assessment center method at work, for development as well as selection. Alverno educators have adapted the method to use it for individual development. Educators also use portfolios and performance interviews assessing performance during college.

## Abilities That Have Been Defined

Abilities can be identified that enable educators to connect an undergraduate liberal arts education to professional performance. Appendices A, B. and C identify several sets of abilities/outcomes that are a reference base for this paper. Appendix A lists abilities that Alverno College has constructed during 18 years of experience in teaching and assessing abilities for credit leading to graduation. These are defined as essential outcomes of college that will serve Alverno graduates throughout their lifetime (Appendix A). These abilities continue to be refined and researched.

In addition to the abilities in Appendix A, Appendix B lists abilities currently under study in five-year alumnae performance. These are faculty-identified outcomes that all students are expected to achieve, but that are not assessed for credit leading to graduation. They include a set of Six Performance Characteristics (Integration, Independence, Creativity, Awareness, Commitment, and Habituality). They also include learning to learn, self-directed or self-sustained learning; self-assessment; cooperation/collaboration in community activity (academic, civic, professional); and understanding oneself in relationship to the world of work/civic duty and to a multicultural context. There are other outcomes that are developed according to the special characteristics of each discipline/profession, reflecting the unique style, interests, and abilities of each student.

In addition, Appendix B lists professional competences. The College has worked to research abilities of outstanding professionals who are not our graduates which can guide, shape, evaluate, and validate faculty definitions of abilities/outcomes in the disciplines and professions. This work was funded in part by the National Institute of Education and a Title III grant from the Strengthening Developing Institutions Program. They include definitions of teacher competences (Diez, 1990), and nursing competences (DeBack & Mentkowski, 1986). They also include management competences studied by McBer and Company (Boyatzis, 1982; Evarts, 1982) and Alverno. Alverno studied a wide range of professionals in the public and private sector (Schall, Guinn, Qualich, Kramp, Schmitz & Stewart, 1984) and women managers and executives in the private sector (Mentkowski, O'Brien, McEachern & Fowler, 1982). The Klemp and McBer sets of abilities are listed in Appendix B, because these generally are defined and researched in ways that are symbiotic to the definition of ability or competence Alverno faculty use, and were generated through methods Alverno researchers also use. The Klemp and McBer competences were included in the synthesis Alverno created to code performances of five-year alumnae after college (Rogers & Talbott, 1991). A short form of this codebook is found in Appendix C, which is a synthesis of the abilities in Appendices A and B. Finally, two additional sets of competences are listed in Appendix B. George Klemp (1988) synthesized competences from studies (1977, 1982, 1991) at Cambria Consulting, and Lyle Spencer and Signe Spencer (1986, June) synthesized competences from McBer and Company research. To date, McBer has completed over 750 job competence studies (McClelland, Spencer & Spencer, 1990).

These "lists" are referenced here in order to make the point that abilities can be identified that enable educators to connect an undergraduate liberal arts education to professional performance.

## Approaches to Relating Student, Alumnae, and Other Professional Abilities/Outcomes to the World of Work

We used four approaches to examine the relationship between the outcomes shown by college students and the world of work. Four independent data sources result: (a) longitudinal studies of student and alumnae outcomes (Mentkowski, 1988; Mentkowski & Doherty, 1983; 1983, revised 1984; 1984; Mentkowski & Strait, 1983; Mentkowski, Rogers, Deemer, Ben-Ur, Reisetter, Rickards, & Talbott, 1991); (b) studies of two-year and five-year alumnae perceptions of the abilities involved in the work place, and of the value of learning in their own evolving life goals (Deemer & Mentkowski, 1990, in progress; Mentkowski, Much & Giencke-Holl, 1983; Giencke-Holl, Mentkowski, Much, Mertens & Rogers, 1985); (c) studies of the abilities actually used by other professionals in job situations (DeBack & Mentkowski, 1986; Mentkowski, et al., 1983; Schall, et al., 1984),

and (d) studies of the abilities actually used by five-year Alverno alumnae and judged for effectiveness (Mentkowski, et al., 1991; Rogers & Talbott, in press).[2]

The data from alumnae and other professionals who are not Alverno alumnae suggest that graduates experience direct transferability, into the workplace, of intellectual and interpersonal abilities learned in college, and there are key abilities exercised by effective professionals which are statistically related to college learning and conceptually linked to the abilities identified, taught and assessed by Alverno faculty. Further, alumnae continue as self-sustaining learners, showing "learning to learn" skills that enable them to develop and adapt abilities, and to achieve job and career satisfactions. Finally, five-year alumnae perform abilities at work. Initial results suggest that effective alumnae performance is distinguished by *taking achievement actions* and *having a positive influence* within a broad organizational context including the development of others (Mentkowski, et al., 1991; Rogers & Talbott, in press).

## Finding: Abilities Function as an Organizing Principle for Role Performance and Career Satisfaction

### Abilities Structure Performance at Work

What are the consequences of organizing college learning and assessment around abilities? Although alumnae used abilities taught in the curriculum, they also used abilities to create a theory of action that gets tested out in various work situations. This sharply contrasts to the view that technical knowledge alone is the basis for effective performance. Alumnae said they do learn new technical skills, but they did not emphasize this knowledge when they described how they go about deciding what to do ("My job is never the same...I use communication and analysis because you work very independently...you have to analyze the financial statements from taxpayers and determine a course of action").

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[2] Data sources. Results are reported from a) curriculum-embedded performance assessments, b) college designed instruments and interviews and c) a battery of 12 external measures of generic abilities, learning styles, and moral, intellectual and ego development (human potential measures). These were completed longitudinally on three occasions (1976/1977; 1978/1979; 1980/1981) by the entire entering classes of 1976 and 1977 during college (n=706), and most measures were completed again on a fourth occasion five years later (1986/87). Measures of abilities, learning styles, motivation, cognitive, moral and ego development were employed along with in-depth, confidential interviews, surveys of student perceptions and background characteristics, and behavioral event interviews (McClelland, 1978) of alumnae performance across settings in work, personal life, and service. Student participation rates ranged from 84 to 99 percent; alumnae (n=358) rates ranged fonm 59 to 88 percent. Data from curriculum-embedded performance assessments in the curriculum, academic reports and a faculty rating of performance characteristics with background factors controlled, were related to changes on the battery of external measures using multiple linear regression, ANOVA for repeated measures and path analysis. Interviews were coded via ethnographic and thematic analysis.

More specifically, the battery of 12 human potential measures and college designed instruments were administered to two complete entering classes and one graduating class (altogether about 750 students). A subsample (n=80) completed in-depth interviews as well at the end of each year in college. The entering classes completed the same battery two years after entrance and again two years later, near graduation, and again five years later. Thus, we have a set of longitudinal results that can be double-checked against results from a cross-sectional study of 60 graduating seniors who participated in 1978 as seniors and 1980 as alumnae, who were compared with entering students who later graduated (controlling for retesting and attrition, with initial selection factors, such as disposition to change, probably uncontrolled). The data on students who completed the 12 external instruments on three occasions provide a parallel stream of longitudinal information alongside these same students' progressive performance on five college-designed measures. The design includes two age cohorts (age 17 to 19 and age 20 to 55 at entrance), to examine the effects of maturation, and two achievement cohorts (high and low, based on number of consecutive assessments completed in the curriculum) to examine the effects of performance in the curriculum. Two class cohorts, with the second cohort analyzed for weekday versus weekend time frames, further enhance representativeness, although only further longitudinal cohorts could truly control for curriculum and societal change effects. The time series design holds time constant and allows performance in the curriculum to vary, so we can attribute change to performance in the curriculum in the absence of a control group of students who did not attend Alverno. As mentioned, we also control for several age, background, and program variables as well as pretest scores when we study the effects of performance in the curriculum. In studies of current students, their current portfolios and other curriculum performance assessments are judged on dimensions of performance by expert judges and related to abilities that define the major.

Analysis of work behavior of experienced, outstanding professionals who are not Alverno alumnae showed that professionals used the abilities, and that abilities were an organizing principle for role performance. In managers' performance interviews, we coded few examples of using *specialized knowledge* as a basis for performance. Managers used these skills, but when they described what they do in situations, broad abilities formed the basis for their actions. In contrast, performance interviews from five-year alumnae were coded for more examples of using *specialized knowledge*. Thus knowledge was important, but knowledge alone did not make for effective performance.

## Technical Skills Are Not Enough

The fact that professionals across all our studies demonstrated a wide range of complex abilities implies that graduates with functional or technical skills alone, or with knowledge alone, will not be effectively prepared to meet the demands of either nursing or management positions. It also implied that abilities that cross position levels and even careers can be abstracted by colleges and built into general education curricula. Abilities that are profession-specific (e.g., "entrepreneurial abilities" for managers or "coaching" for nurses) can become the cornerstone for further development in majors.

Certainly specific training is needed for any entry level position, but for persons who plan a career in the two professional areas we researched, an education to prepare them for the future needs to include learning to integrate a number of abilities, to test them out in a range of actual work situations, and to critically appraise one's own performance.

## Alumnae Experience Competence and Career Satisfaction

The experience of competence is a key factor in career management and job change. Graduates viewed work not just as a job, but as a career that changes and develops through work experience. Older women had a specific direction toward long range career goals; younger ones were more immediately focused on developing competence in their present job. But for all of them, career satisfaction was strongly related to their experience of competence on the job.

Experiencing competence seemed to be a critical factor in whether graduates changed their job or career; it also seemed to "carry over" from one job to another. While graduates adapted to problems encountered in the first two years of work, including the traditional "reality shock" or disillusionment experienced by most new graduates, the persistent feeling of not being able to perform in the job role, for whatever reason, led to change of jobs, if not career fields. Such changes were generally successful and appeared to reestablish the graduates' feeling of professional competence, the basis for their self-esteem. Apparently, these graduates could change jobs and careers effectively if they have a sense of competence and strive to develop it in whatever role they choose.

Using abilities led to self-confidence on the job and was the basis for job satisfaction. Being able to perform abilities led to staying on the job.

**PERFORMING ABILITIES → SELF CONFIDENCE → JOB SATISFACTION**

**LACK OF OPPORTUNITY TO PERFORM ABILITIES → JOB OR CAREER CHANGE**

**CONTINUED LEARNING → DEVELOPING AND ADAPTING ABILITIES → JOB SATISFACTION**

Another important indicator of job satisfaction was the degree to which alumnae experienced continued learning, an intrinsic value which motivated not only career development and job choice, but also determined whether an alumna continues to develop and adapt her abilities.

### Alumnae Perform Abilities at Work

As demonstrated in other studies, the performance interview data showed that five-year alumnae frequently accurately self-assessed a good performance as good. Also, they sometimes spontaneously abstracted their key abilities in describing events or used their self-assessment to evaluate whether their abilities were sufficient for what was required. Of course alumnae were not immune to occasionally overlooking a weakness or mistake but generally they more or less accurately self-assessed their performance. This relates to the expectation of Alverno faculty that students transfer their ability to self-assess college work, to self-assess their performances after college. The association of accurate self-assessment with positive evaluations of performance during an event suggests that self-assessment may improve ongoing performance, as well as future performance. Self-sustained learning may often be an important part of the performance itself.

Alverno alumnae also often gave their colleagues or staff at work specific feedback and resources that improve their performance. Not only does this development of others demonstrate internalization of the value of learning and taking on broader commitments, but it also should encourage college faculty to envision educational effects beyond those that they directly teach. This finding suggests an important link: when Alverno faculty give students feedback and self-assessment opportunities in relation to performance, then those students who have internalized educational principles, themselves became effective staff developers in the work force. Apparently, experience with the performance-assessment process had effects beyond its immediate impact on students or alumnae.

We conclude from these findings that (1) abilities connect education and work in both the performance of graduates from an ability-based curriculum and the performance of outstanding professionals who graduated from other programs; and (2) abilities function as an organizing principle for role performance and career satisfaction. Therefore, we make the following recommendation.

> Recommendation #1. A national assessment system should assess for abilities that connect education and work. These should be assessed on the job within appropriate contexts as well as in the college setting.

## IMPLICATIONS, ISSUES, AND QUESTIONS

- What abilities should be assessed?

An initial response is that those that connect education and work. But if we assess only for abilities that connect college and work, then some abilities assessed in college and at work—namely, those that are not demonstrated in one of the contexts—will not be measured by a national assessment system that looks at graduates' performance on the job. But assessing both sets of abilities, those that do cross settings and those that do not, would help us identify those abilities that should be taught in college and those abilities that are also performed at work. Those abilities that do connect can be assessed both in college to measure the outcomes of college learning and in the workplace to demonstrate accountability and to improve definitions of abilities back on campus.

• What abilities are learned in college and performed at work?

A second question is "Can we clarify elements of abilities that are learned in college and performed at work?" We take up this issue later ("What Have We Learned," #6). Before we can move on to a discussion of the issues that assessment of abilities at work raise for a national assessment system, we must first deal with the question of how abilities are best defined. This is the focus of the next section.

Principle Learned #2. Abilities defined as having multiple components, and as integrated, developmental and transferable, are likely to make sense both to educators and employers.

## Defining Abilities

Many institutions are making outcomes explicit by defining abilities like critical thinking that they expect students to master by the end of general education or the major. But how are they defining these abilities? How do employers define abilities for purposes of training on the job and performance appraisal?

Definitions of critical thinking and other complex abilities are informed by new definitions of intelligence. Howard Gardner's (1983) multiple frames of mind and Robert Sternberg's (1986) triarchic theories of intelligence describe the complexities of critical thinking. Further, even critical thinking measured by a traditional instrument like the Watson-Glaser Critical Thinking Appraisal (1964) shows a pattern of development during college and afterward that differs from the pattern on a measure like the Test of Cognitive Development (Renner, Fuller, Lochhead, John, & Tomlinson-Keasey, 1976) in Alverno longitudinal studies (Mentkowski, et al., 1991).

Thus, defining abilities is not an easy task; how they are defined remains a critical issue. The definitions specified below undergird all the recommendations made in this paper for assessing abilities in a national assessment system.

*Abilities have multiple components, including motives or dispositions, self-perceptions and attitudes, skills, behaviors, and knowledge.* This definition of ability undergirds the research reported in this paper, whether conducted by Alverno researchers (DeBack & Mentkowski, 1986; Mentkowski, et al., 1982; 1991; Rogers & Talbott, in progress), or by other faculty and researchers in the United States and the United Kingdom (Burke, 1989; Jessup, 1991; Klemp, 1988; McClelland, et al., 1990). Clearly, knowledge is only one component of an ability and abilities include skills and behaviors. Thus, abilities link knowing and doing, knowledge and performance. These components differ in the degree to which they are directly observed in performance. Some are observed with confidence. In any event, ability components serve as a heuristic in defining abilities.

The terms *ability* and *competence* are somewhat synonymous. Alverno faculty have moved to the term *ability* so as not to be confused with competencies that are often narrowly defined as a list of behaviors. Those researchers we have worked with share the definition of competence that invokes a causal relationship to effective performance, as Klemp and Sokol describe below:

> The kernel of competence lies in effective performance by the individual. For the purpose of this report, a *competency*, or component of overall competence, is a *characteristic of an individual that underlies effective work performance*. A competency can be any human quality: It can be knowledge, a category of usable information organized around a specific content area (for example, knowledge of mathematics); it can be a skill, the ability to demonstrate a set of behaviors or processes related to a performance goal (for example, logical thinking); it can be a trait, a consistent way of responding to an equivalent set of stimuli (for example, initiative); it can be self-schema, a person's image of self and his or her evaluation of that image (for example, self-image as a professional); or it can be a motive, a recurrent concern for a

> goal state or condition which drives, selects, and directs behavior of the individual (for example, the need for efficacy). A person may possess many of these characteristics, but by our definition, if the knowledge, skill, trait, self-schema, or motive is not explicitly related to effective performance, *it is not a competency* (Klemp & Sokol, 1980, p. 2).

*Alverno faculty define abilities as integrated, developmental, and transferable* (Alverno College Faculty, 1979 revised 1985). Abilities are integrated, inseparable parts of a person, not a set of discrete skills. Our research shows that integration can occur among several abilities within a situation or a context (e.g. intellectual and interpersonal; intellectual and socio-emotional). Integration can occur between knowing and doing (abilities and use; thought and action, knowledge and performance). Integration can occur between perceptions of what abilities are needed and actual abilities performed (Mentkowski, 1988). Clearly, the question of whether abilities become integrated is critical. Does an individual actively construct abilities into a complex whole and show coordinated use of multiple abilities in a situation, in a way that the performance of each ability is supported by the others?

*Alverno faculty also define abilities as developmental*, or teachable. If an ability is developmental, it can be defined in sequential descriptions or pedagogical, cumulative levels (see Appendix A for abilities defined as performance levels by Alverno faculty) that describe increasingly complex elements or processes for teaching and assessing performance. Thus, abilities are often defined via criteria that are increasingly complex across pedagogical levels or professional positions (McClelland, et al., 1990; see Appendix D).

Finally, *Alverno faculty define abilities as transferable*. They do not see them as a set of discrete skills performed and dictated solely by a particular setting or context. In our experience, educators identify with such a definition because they need to teach and assess for abilities that prepare students for the many roles and settings in which graduates will perform. Transferability is critical because even experienced professionals continue to change positions, roles, and responsibilities. While a broadly-defined ability does not usually have a one-to-one correspondence with observable actions in performing a professional role, it represents underlying characteristics that can be applied to describe the successful integration of a variety of ability components.

Our studies confirm that complex abilities can be successfully integrated as a result of a college experience stressing an ability-based, outcome-centered approach to learning (Mentkowski, 1988; Mentkowski & Doherty, 1983, revised 1984; 1984). These abilities can be identified, developed, and used to achieve success in educational and work environments. We can also identify contributors to effective outcome-centered learning. These contributors include instruction itself, as measured by the amount of student change on faculty-designed instruments and those from outside the college, and other curricular elements, like feedback and self-assessment, identified by students as important for their learning. Our data also showed the impact of education on the demonstrated abilities of alumnae and other professionals.

### Finding: Abilities/Outcomes Are Complex, Integrated Human Abilities

We researched outcomes through several different frameworks and measures in our longitudinal studies. Clearly, an ability like critical thinking has cognitive, affective, kinesthetic, and social dimensions. It is expected to transfer to multiple aspects of work and community life after college. It is clear that definition and measurement of college outcomes needs to include a range of processes and dimensions: cognitive/ intellectual and affective/socio-emotional processes and perceptions, motivation and performance dimensions. The outcomes studied by our battery of twelve external measures were differentiated into two separate factors at entrance to college and two years later, but were integrated by graduation. Educators may need to differentiate cognitive and affective aspects of abilities in order to teach for them, but they should assess them simultaneously. Most educators are struck by the difficulty of any attempt to separate these aspects.

It is also clear from our study of student performance on external measures that educators defining abilities

needed to attend to individual differences in level of cognitive development. This has several implications for developing instruction and assessment. Faculty who rate students on a set of performance characteristics seemed to be tapping student development, since the ratings correlated with cognitive-developmental level. If Alverno faculty were thus aware of students' developmental level—along with the more tangible abilities involved in their day-to-day assessments—we might infer that they also took developmental level into account in instructional planning, in their interactions with students, and in designing assessments.

It is also clear that complex outcomes need to include a performance dimension. Learning to perform, to link knowledge to performance, is a dimension of abilities separate from the cognitive-intellectual one. This was borne out by the correlation of cognitive-developmental level with the concrete experience/abstract conceptualization dimension of learning styles. Cognitive-developmental level did not correlate with the reflective observation/active experimentation dimension. Educators have long sought an adequate learning theory that incorporates not only knowledge and cognitive/intellectual processes, but also the more practical learning that occurs when ideas are tested out in actual situations. This practical learning can be expected to transfer across contexts to the world of work. For students in our study, learning to perform, to link knowledge to performance, enabled them to find reasons for trying to learn in a variety of ways. They tried out the abilities through application to professional performance and in their personal life. By doing so, they experientially validated the abilities or competences they were developing. The concept of "competence," which implies knowledge and action, became a motivational link as well. Students began to see themselves as competent. Thus, outcomes showed a perceptual and motivational dimension that assist in their internalization and transfer. Values and motivation for performance had their roots in students' justification for learning as a stepping stone to a career and economic mobility. Along the way, self-sustained learning, a liberal arts value, became part of the student's reasons for continuing in college. The student came to perceive herself as a self-directed learner, who seeks "well-roundedness," as well as career goals.

Complex abilities, which include cognitive, affective, behavioral, motivational, and perceptual components, did fit together and/or integrate to some degree by graduation. This suggests that the abilities are ultimately integrated in performance.

### Finding: Abilities/Outcomes Are Developmental and Teachable

#### Abilities/Outcomes Develop as the Result of the Curriculum

In our studies, complex outcomes or abilities changed over time and were related to performance in the learning process. Thus, they are developmental or teachable. We linked outcomes specifically to college instruction in six ways: (1) by relating students' change on faculty-designed assessments to instruction (Alverno College Assessment Committee/Office of Research & Evaluation, 1980; Friedman, Mentkowski, Deutsch, Shovar & Allen, 1982; Friedman, Mentkowski, Earley, Loacker & Diez, 1980), (2) by analyzing in-depth confidential semi-structured interviews of student constructions where students attributed changes in their learning to curricular elements, (3) by analyzing student change on twelve external instruments drawn from outside the college (Mentkowski & Strait, 1983; Mentkowski, 1988), (4) by analyzing alumna ratings and confidential interviews where graduates described using abilities in post-college settings (Giencke-Holl, et al., 1985; Mentkowski, et al., 1983; Deemer & Mentkowski, in progress), (5) by relating educational background to the demonstrated abilities of professionals who are not Alverno alumnae (DeBack & Mentkowski, 1986; Mentkowski, et al., 1982) and (6) by studying alumna performance in work and personal roles (Mentkowski, et al., 1991; Rogers & Talbott, in press.) All of these sources validate the testimony of faculty who say they see students learning, of external assessors who credential some of these abilities, and of other students and alumnae who say they are learning abilities, and demonstrate this by the increasing complexity of their descriptions through time and across settings.

## Older Students Also Develop Outcomes as the Result of Instruction

Student progress through the assessment process showed no noticeable deficit for the older student. The very structure of Weekend College (an alternate time frame that requires more independent learning and that is attended mostly by adult students) presumes that the older adult can move at a more intense rate. Not only must she evidence this cognitively, but also in organizing multiple roles and responsibilities. Yet, there is no evidence of older students suffering any disadvantage from having been away from formal academic work. In fact, there was a cognitive advantage that allowed them not only to cope with the program but to cope with a concentrated program that is even more demanding. That presumption is borne out, by students attending Weekend College, in their performance on external instruments. Their performance changes were not fewer than those of students in the regular college time frame. In fact, our analyses of the external instruments show that age was initially an advantage in some areas because the experience that it implied enabled the student to take on this cognitive overload and deal with it successfully. Older students also developed their abilities as the result of instruction. By the time they were more than two years along, the educational environment itself was a more likely determinant of learning. At the same time, older students began at the same place as traditional age students in some areas, such as their understanding of classroom learning processes and roles.

This difference between the older and younger adult showed up after college. The experienced adult showed more specific direction toward long-term career goals, in contrast to the younger graduate who was more focused on immediate ones. Both groups, however, reported having to apply the same kinds of abilities to post-college work settings—interpersonal and reasoning abilities. Thus, adults had an advantage in some areas but not in others. But it appears that the ability-based curriculum at least was capable of capitalizing on the differential abilities of the new learner.

As context for this finding, it is important to note that our institution has a mission to serve working class students who are often first generation college students. For this student group, higher education can build on their particular strengths and background and enable them to continue capitalizing on it even after they have graduated.

## Abilities/Outcomes Develop at Different Times

Equally important was the time frame for development. There were differences in when complex abilities develop during the college years. And as educators have always suspected, there was a difference between the general education experience and the later years when the student focused on a major. Older and younger students performed differently with respect to some cognitive-developmental patterns and abilities but not others. Further, abilities that may be differentiated during the first two years of college became integrated during the last two years, although how this happens is not clear to us now. The competence models developed from effective professionals in nursing and management show that abilities differed in complexity and sequence and suggest that the order of abilities is important and can be identified. Professionals were more likely develop some abilities exclusively on the job. Experience sometimes added to a student's ability to take advantage of college, but some key abilities critical for effective work performance were developed over time in long term formal learning experience.

## Alumnae Continue to Develop and Adapt Abilities

We found that abilities were refined depending on their specific application. They were also combined in various ways given situational demands, and they were adapted to fit a particular action plan. Alumnae spoke again and again of combining ("trying to take everything and put it together in a workable process") and modifying their abilities ("I should not have come on so directly in getting him to try out this new equipment.

I needed to show him how we can get the work coordinated and out faster, first"). In the studies of professionals, effective managers and nurses consistently used a combination of abilities in a single situation. The same holds true for five-year alumnae performance studies.

### Developmental Patterns Are Subtle and Complex

When we look at the rate and quality of change, we note the kinds of subtle and complex developmental patterns that will ultimately be of most use to practitioners and to theorists. As we study students' developing perceptions, we see that students did value open-mindedness and self-direction and seemed to demonstrate it increasingly. We would like to be able to account for how students actually did undergo the changes that they demonstrated in their interviews. It is our conviction that communicating these subtle and complex patterns across disciplines to a wide range of faculty is a prelude to refining the criteria for assessment of these abilities.

## Finding: Outcomes are Abilities that Transfer to Performance at Work

### Alumnae Realized Career Expectations

Alumnae surveys reveal that graduates were successful in achieving their immediate career-oriented goals. Over 90% of Alverno alumnae were employed in fields related to their college major within six months of graduation.

In one alumnae survey, we found that these alumnae were more likely to obtain professional positions than their mothers; education clearly seems to function for them as an effective route to professional careers. Graduating seniors had higher career expectations than alumnae were able to realize in two years, but alumnae rated aspects of satisfaction with their first positions and potential for advancement as above average. Alumnae also show a more positive attitude about their college learning after two years than seniors express at the time of their graduation, although both groups rated their college experience as above average on a majority of items (Mentkowski, et al., 1983).

Given their generally positive attitudes toward college preparation, how did alumnae abilities carry over to performance? Faculty had identified intellectual and interpersonal abilities for the new curriculum based on experience as educators and professionals and on an analysis of academic disciplines and literature reviews. But would these same abilities form a basis for effective performance at work after college?

### Abilities Learned in College Are Used by Alumnae

We found a remarkable congruence between the abilities graduates say they used in the work place and those that Alverno educators consider important outcomes of college. Intellectual and interpersonal abilities were both identified as necessary for coping successfully with a range of situations. Abilities in general functioned as an organizing principle for role performance and careering.

Professionals' perceptions of abilities descriptive of outstanding performers were congruent with demonstrated abilities on the job for managers but not for nurses. Why this is the case is not clear, but it reinforced our decision to assess the effective work performance of alumnae in addition to their perceptions. The fact that alumnae have focused on developing abilities during college might make for more congruence, but this cannot be taken for granted. Since career variables like salary and status were not linked to effective performance for women in an emerging field like management, colleges seeking to validate their curriculum for women alumnae need to rely on performance as their indicator in addition to measures of perceptions and self-report indicators of career advancement.

Competence is a Concept and an Experience

College outcomes and work were related very strongly by the notion of self-perceived competence. It was a cognitive organizer for learning both in college and at work. It was one of the most powerful experiential triggers for development according to two-year alumnae constructions about how they manage their career changes and career satisfactions.

In sum, much of the power of outcome-centered education comes from the fact that the mere act of identifying outcomes as abilities and giving people a chance to practice them has an impact that carries from college to later life. Often, educators attempting outcome-centered education are in large part responding to the press for work-usable education without sacrificing what education has traditionally meant. It seems possible to take a liberal education and define it in terms of ability outcomes that students can make part of their experience, creating an effective, lasting link between education and the world of work without having to sacrifice the value of those complex outcomes/abilities that inform the commitment of the liberal educator. The outcomes/abilities of liberal education can be identified, and when identified and experienced by the student, do persist.

Therefore, we make the following recommendation for a national assessment system.

> Recommendation #2. A national assessment system should define abilities as having multiple components, and as integrated, developmental and transferable, so they make sense to educators and employers.

IMPLICATIONS, ISSUES, AND QUESTIONS

• How are abilities best defined?

How abilities are defined is a critical issue. If performance criteria are to function as standards, then definition of abilities will remain a matter of some debate, and will continue to focus research for some time to come. We have found that this is a continuing search; in fact, Alverno faculty, with ongoing review and changes in ability definitions, just issued an official redefinition of four of the eight abilities in 1991.

• What does it mean to assess both cognitive and affective components simultaneously?

There has been a good deal of discussion in the literature (Astin, 1991; Erwin, 1991; Terenzini, 1989) about the importance of measuring cognitive and affective components of abilities in college outcomes studies. We have concluded that cognitive and affective components of abilities appear simultaneously in the performance of abilities, and therefore, ability components should be assessed in performances that engage a range of components simultaneously. That means cognitive and affective components should not be separated in assessments that are designed to measure impact of college learning on abilities demonstrated in work and citizenship.

• How do we measure content and abilities, knowledge as well as performance?

Messick (1982) and Wolf (1989) argue forcefully that it is not just the amount of knowledge that is at issue, but also the organization or structure of knowledge that acts as a functional system for performance, particularly for abilities like problem solving.

Jessup (1991) comments that the knowledge underpinning one element of an ability may also be relevant to many other elements. He argues that "when the body of knowledge is taught separately from the practice of a profession it tends to become an end in itself, developing its own structure and priorities, with the result that it does not necessarily relate closely to practice" (p. 126). The same holds true for assessment. Jessup discusses the dilemma of assessing knowledge in relation to performance in this quote:

> [Regarding]...the dilemma of assessing knowledge in relation to performance or as a body of knowledge largely separate from performance, the ideal solution is perhaps to do both. Where a coherent body of knowledge exists, and where it is also studied for reasons other than practicing a related profession, there is justification for pursuing it separately. It will also no doubt be assessed separately. But this should not be regarded as sufficient evidence or as a direct substitute for assessing the relevant knowledge in relation to professional performance. When theory is developed separate from professional practice it takes on a life of its own with its somewhat different values, priorities, constructs and language. It tends to pursue lines of development and address problems of intellectual interest, rather than the problems identified in the practice of the profession...Even when the theories are relevant, the connections with practice have often not been adequately established during training to facilitate their application...An analysis of the knowledge which people actually draw upon, and need to draw upon, to perform competently, may not appear in what is taught as the body of knowledge underpinning a profession or occupation...or, if it is covered, may not be accorded the priority it deserves. Competent professionals tend to acquire a set of guiding principles, of which they are often only partially conscious, derived largely from their experience. These may build upon 'academic' theories and knowledge or be only loosely related. While this is recognized in areas such as management, it also appears to be true in well established professions such as medicine...it would seem necessary to...assess the knowledge required to underpin and extend competent performance, directly in relation to such performance...this should occur even if the knowledge is assessed separately as part of an academic discipline (Jessup, 1991, pp. 126-127).

- How define construct validity when abilities are multidimensional rather than unitary constructs?

Further, the definition of abilities as having multiple components counters measurement of critical thinking—or other broad ability identified in the National Goals—as a unitary construct. That is important because most of the available psychometric procedures treat constructs as unitary rather than multidimensional (Frederiksen, 1986). Further, when we are just beginning to define these abilities, our definitions will shift over time, as we learn from the experience of trying to measure them. What is construct validity when abilities are not fully defined or when definitions of the abilities emerge in part during the assessment process, as an assessor is judging a unique performance? These are clearly issues that still need resolving (Mentkowski, 1989, 1990).

- What is good evidence?

Performance assessment is tugging at the edges of traditional measurement. Here, the unit of analysis, that is, "good evidence," is expanding from student selection of predetermined test item alternatives—or even short answers—to include proactive, open, interactive, dynamic, sustained student performance (Loacker, 1991). The measurement strategies described in later sections in this paper include such performance samples that are measured in context. This means that the abilities and accompanying performance criteria that define them cannot be assessed outside of a particular context, or it will not be clear whether the evidence is sufficient or not, nor what that evidence should be (Wolf, 1989). Wolf acknowledges the difficulty of making correct inferences about abilities without large amounts of evidence, and of acquiring adequate evidence by focusing only on the ability without the contextual referent. Often, one sees only some components of an ability. How then can we be sure we are seeing it? Clearly, multiple sampling in situations after college at work is essential.

• What is the developmental sequence of abilities?

Perhaps an even more critical issue has to do with the developmental sequence of abilities. Alverno faculty consistently assess for levels of abilities, defining them in terms of beginning, developing, and advanced abilities (Alverno College Faculty, 1991; Diez, 1990; Roth & Riordan, 1984) (see Appendix A, F). First, our research suggests that abilities not only developed at different times, but that they were sequentially related in the world of work. Our study of outstanding managers and executives enabled development of a competence model which confirmed that some abilities are sequentially related to others, and suggested that dispositional components of abilities like socio-emotional maturity undergirded development of more specific, job-related abilities like efficiency actions or proactivity. Our study of nurses showed that the helping abilities did not require the sophisticated knowledge and conceptualizing skills that coaching abilities did. Coaching went beyond strategic influencing when nurses specified the direction of behavioral change toward increasing the responsibility of others. Clearly, a good deal of research will need to accompany the specification of abilities as developmental.

• How measure changes in abilities after college?

Further implications follow from the conclusion that effective assessment means linking information on how students come in to a program to how they graduate, and relating those changes to the curriculum (Astin, 1991; Mentkowski & Doherty, 1983 revised 1984; Mentkowski & Strait, 1983). When an assessment system is committed to measuring change over time, strategies that assess complex, higher order abilities may generate changes in abilities that may be qualitative, nonadditive, and nonlinear. The appropriate model is development and change, not consistency across time, or continuation of a similar ability.

Assuming change means that prediction will not necessarily rest on an additive model. That is, we will not necessarily expect to see "more of the same" after instruction or after college, but rather, qualitatively different learning outcomes. How do we show change? What kinds of measures will validly take this assumption into consideration (Collins & Horn, in press; Willett, 1988, 1989)?

Further, if abilities are developmental, and they continue to be adapted by alumnae after college, as our research suggests, then this will have implications for the assessment of college-learned abilities in the workplace. Messick (1980) argues that assuming change rather than consistency should influence our expectations. Assuming change means that prediction will not necessarily rest on an additive model. "How measure development of abilities after college?" To reiterate, the appropriate model is development and change, not consistency over time, or continuation of a similar ability.

• How define reliability when we assume change rather than consistency?

When we are looking for a complex ability in a student performance at graduation, will we expect to see more of the same if we look for that ability after one year in the workplace or five years after graduation? Or will we expect to see a qualitatively different ability, particularly when he or she demonstrates that ability in a setting that is quite different from college? When our developmental model assumes change, rather than persistence of an ability, it does not follow that persons who do not demonstrate the ability, cannot develop it, or even that they cannot demonstrate it. What kinds of measures will validly take this assumption into consideration?

What happens when we add the assumption that development is, at times, nonlinear? Alverno longitudinal study results (Mentkowski, 1988) suggest that individuals recycle through earlier forms of thinking when they meet new situations. Here, change is not always consistent, "upward" movement on measures of development. How does this assumption shape the assumptions underlying models of assessment where one is demonstrating that college-learned abilities make a difference in how abilities are performed in work and citizenship roles

after college? What kinds of assessments are valid under these conditions? And how do we define reliability when change rather than stability is the rule, when we assume change rather than consistency (Mentkowski, 1989, 1990)? In addition, what the components of abilities are, and how well they can be specified in performance criteria will continue to challenge us.

• Can all outcomes be specified?

Probably not, but the effort to do so is an exciting one. As one sees students learning and alumnae performing as a result of understanding what to perform, one is motivated to continue the effort. The danger in the approach is that specification becomes an end in itself, and we begin to get so specific that behaviors are no longer linked to the nexus of motivation, attitudes, knowledge, self-perceptions and skills that underlie complex performances.

Principle Learned #3. Thinking critically, communicating effectively and solving problems are abilities common to college education and work. Effective performance at work is integrated; it is made up both of intellectual and interpersonal abilities.

In this section, we make the case that to effectively make education-work relationships, the abilities of thinking critically, communicating effectively, and solving problems, identified in the National Goals, should become part of faculty and employer expectations. Research reported here suggests that effective performance at work was likely made up equally of interpersonal and intellectual abilities that are integrated in the performance. Interpersonal ability was an important outcome of college that is also essential to the workplace and should be incorporated with the three outcomes already defined. It is important to assess these abilities in order to demonstrate relationships between education and work.

Examining effective performance at work includes looking at adaptation to new settings. If individuals are somewhat at sea in new settings, what do they use as a lifeline (Mentkowski, 1988)? What kinds of abilities are needed to carry the individual through a variety of new settings and situations? Do these abilities become integrated—that is, does an individual actively construct them into a complex whole and show coordinated use of multiple abilities in a situation, such that the performance of each ability is supported by the others? Cognitive-developmental models of life-span growth (that is, moral, intellectual, and ego development), were used as college outcomes measures in our longitudinal study. These describe ways of *thinking*. They do not describe what people *do* in situations, their ways of *performing*. To examine integrated performance that enable on-the-job functioning, it was necessary to move beyond intellectual, ego, and moral mindsets to actual behavior. To do that, we researched broad, holistic *abilities* or *competences*, two terms we use interchangeably to describe learned dispositions to perform in ways that reflect specialized knowledge, attitudes, motivation, self-perceptions, and skills.

Our research suggests that the broad, faculty-defined abilities that students develop across the Alverno curriculum do become integrated and do allow for role performance. What is interesting for understanding the development of integrated performance is the combining of these abilities. While *intellectual* development and competence in intellectual abilities have long been the cornerstone of general and professional education, our research indicates that *interpersonal* abilities are just as important. Indeed, integrated performance on the job demands both sets of abilities. To examine the evidence, we now turn to three data sets from students, alumnae, and professionals who are not Alverno graduates.

### Finding: Students Synthesized Intellectual and Interpersonal Abilities

In looking for relationships among the cognitive-developmental patterns, learning styles, and generic abilities we measured, we found the following unexpected but valuable result (Mentkowski and Strait, 1983): Students' performance on the battery of twelve measures, at entry to college, and again two years later, tended to cluster statistically around two separate developmental factors (one we call logical or analytical thought and one we call socio-emotional maturity or interpersonal ability), but after four years in college, the two clusters had merged. This may reflect one of the most desired outcomes of college—namely, that students integrated their own understanding and use of these two kinds of abilities. If this is the case, personal integration may assist in keeping them from being intellectually, emotionally, and morally "undone" in new unfamiliar settings.

Let's explore this integration theme further. Are intellectual and interpersonal abilities integrated once the individual faces the world of work? Because the Alverno faculty had identified intellectual abilities and interpersonal ones as curricular outcomes (Alverno College Faculty, 1979 revised 1985), they wanted to know whether these abilities would lead to effective performance at work after college. Some interesting results emerged from studies of Alverno alumnae and from studies of practicing professionals who are not alumnae. Evidence from the two independent data sources shows that both intellectual and interpersonal abilities are critical for effective work performance.

### Finding: Alumnae Stressed the Importance of Both Intellectual and Interpersonal Abilities

In analyzing alumnae interviews[3], we found two major categories of complex abilities that were equally important in managing their work roles and careers. Both younger and older women, across all professional groups, cited reasoning abilities—using such terms as *analysis, problem solving, decision making, planning,* and *organizational abilities*—as important to their career performance. But alumnae *also* consistently emphasized *interpersonal abilities* learned in college as critical to their effectiveness on the job (Giencke-Holl, et al, 1985; Mentkowski, et al. 1983).

Some abilities identified as crucial to effective performance, such as reasoning abilities, on the face of it, were similar to those identified by most college and professional school educators. In contrast, interpersonal abilities, long an expected result from informal learning alone, were critical to effective performance as evidenced in the observations of working alumnae. The finding also suggests that *all* highly complex cognitive abilities should be integrated with high-level interactive ones. Clusters of abilities carried forward from college to the world of work. When integrated and adapted to the workplace, they contributed to effective performance. The assessment of highly complex cognitive abilities should be assessed through performances that also engage interactive and interpersonal abilities.

### Finding: Practicing Professionals Also Used Both Intellectual and Interpersonal Abilities

The Alverno studies of effective managerial and nursing performance were designed to build a bridge to professionals who were *not* Alverno alumnae in order to validate abilities the faculty had identified (DeBack & Mentkowski, 1986; Mentkowski, et al, 1982)[4].

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[3] Of 60 Alverno seniors studied intensively near graduation, 32 participated two years later in three-hour semi-structured, confidential interviews of their perceptions of their abilities, learning, and personal growth.

[4] For the management study, local business leaders nominated 146 women managers and executives as effective. Over 100 of these from 53 private corporations met our criteria for "manager" and provided us with job performance interviews and careering histories; perceptions were assessed through ratings of abilities critical to education, selection, and performance (Klemp, 1978; McClelland, 1976). The job performance interviews were analyzed for managerial competences (Boyatzis, 1982; Evarts, 1982) that characterize effective on-the-job performance. For the nursing study, three health care settings (acute care, long-term care, and a community agency) were selected for their excellent reputation in both lay and professional communities so that more effective performance was more likely measured.

The following is a list of the resulting managerial competences in order of the frequency with which they were *actually performed* in our study, from most often to least often: proactivity, diagnostic use of concepts, development of others, accurate self-assessment, efficiency orientation, expressed concern with impact, conceptualization, self-presentation, perceptual objectivity, oral communication, use of unilateral power, self-control, management of groups, positive regard, use of socialized power, logical thought, stamina and adaptability, spontaneity, specialized knowledge, and concern with affiliation.

Intellectual and interpersonal abilities had equal importance for these professionals. Managers were equally likely to use intellectual abilities (thinking through problems, applying past experience to interpret events, using a framework to guide analysis and actions) as interpersonal abilities (using power, developing subordinates, managing groups).

The set of competences identified in the study of nurses consists of nine abilities. These are defined in a codebook of performance criteria. The following is a list of these nursing competences in order of the frequency with which they were *actually performed* in our study, from most often to least often: helping, influencing, independence, coaching, conceptualizing, ego strength, emotional stamina, reflective thinking, and positive expectations. The negatively coded competences, ranked for frequency of negatively coded incidents, are: conceptualizing, independence, positive expectations, ego strength, and emotional stamina. Influencing is an ability that calls for intellectual as well as interpersonal skills. It involves providing a rationale for a

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Eighty-three female staff and supervisory nurses were selected through peer nomination as outstanding performers and were interviewed along with a group of those not nominated. These nurses, from a wide range of units in the three settings, provided job performance interviews, careering histories and perceptions of abilities critical to education, selection, and performance.

The set of managerial competences consists of four ability clusters: Socio-emotional Maturity, Intellectual Abilities, Interpersonal Abilities, and Entrepreneurial Abilities. Each of these clusters is described by several competences, and each competence is elaborated through a set of behavioral descriptors. The four clusters, together with the competences, are presented below. These are defined via a codebook with performance criteria.

**Competence Model for Effective Managerial Performance**

**Socio-emotional Maturity**
- Self-control
- Spontaneity
- Perceptual Objectivity

**Interpersonal Abilities**
- Development of others
- Expressed concern with impact
- Accurate self-assessment
- Stamina and adaptability

**Entrepreneurial Abilities**
- Efficiency orientation
- Proactivity

**Intellectual Abilities**
- Logical thought
- Conceptualization
- Diagnostic use of concepts
- Specialized knowledge
- Use of unilateral power
- Use of socialized power
- Concern with affiliation
- Positive regard
- Management of groups
- Self-presentation
- Oral communication

**Competence Model for Effective Nursing Performance**

- Conceptualizing
- Emotional Stamina
- Ego Strength
- Positive Expectations
- Independence
- Reflective Thinking
- Helping
- Influencing
- Coaching

desired behavior, including appealing to a higher motive and providing valid information in order to change an attitude or behavior. But it also means persuading by a variety of strategies, refocusing negative emotions to constructive issues, and persuading someone to follow the nurse's example. Effective nurses used coaching to change client attitudes and behavior, which means rewarding desirable behavior or giving positive feedback in other ways, providing information to increase the other's responsibility, and encouraging others to take more responsibility for their own care. In conceptualizing, they created patterns of data, identified health problems, and gave rationales for treatment plans. In demonstrating emotional stamina, they did not allow emotions to interfere with performance, but controlled anger, overcame fear, or responded calmly when attacked.

Intellectual and interpersonal abilities shaped effective, integrated performance of effective nurses, managers, and alumnae. Therefore, we make the following recommendation.

> Recommendation #3. A national assessment system should assess for abilities already identified in the national goals and should provide for performances that integrate intellectual and interpersonal abilities.

## IMPLICATIONS, ISSUES, AND QUESTIONS

That effective staff and supervisory nurses, as well as managers and executives showed integrated performance of these abilities in situations is consistent with the frequency of observing performance of several competences simultaneously in a single situation. To ensure effective career performance for their graduates, educators have to focus not only on the development of cognitive skills but also on their integration with high-level interpersonal ones. Multiple assessment strategies are needed to also tap both intellectual and interpersonal abilities.

- What does it mean to assess different components of abilities simultaneously?

Again, abilities that have multiple components and that are often integrated in a single critical incident or event in the workplace have intellectual and interpersonal components. Ability descriptions that emerge in studies of professionals cited in this paper consistently include both. If we follow the above recommendation, we can still expect a good deal of frustration both in specifying abilities and measuring them in context.

- How assess integrated performance?

Understanding what it means to assess for *integrated* performance is one of the more challenging issues in sampling graduates' work or service performance. In Recommendation 2, we argued that we need to assess cognitive and affective components simultaneously. Still another kind of integration is called for in the graduate bringing together specialized knowledge and his or her performance in a particular task or setting.

Here we are led again to argue that effective performance at work is integrated; that it is made up of both intellectual and interpersonal abilities. By now we are confronting implications for measuring post-college abilities at work. Measures need to consider the performance that can enable us to observe integrated performance. So far, we have used both performance interviews that rely on behavioral events and perspectives interviews that measure perceptions of integrated performance, and the actual combining abilities in situations. Here we acknowledge the issue, "How assess for integrated performance?" We will find the question again in the next section, as we discuss another form of integration—between thought and action. This kind of integration is a component of self-sustained learning, which we will now discuss as a critical element in transferring college-learned abilities to the world of work.

Principle Learned #4. To effectively transfer college-learned abilities, students need to develop learning to learn skills, or self-sustained learning. Assessment that incorporates feedback and opportunities to self-assess fosters self-sustained learning.

Self-sustained learning that links education to work is an important outcome of college that should be added to the three outcomes already defined in the national goals. Self-sustained learning is a key ingredient for enabling the college graduate to link education to work; i.e., abilities learned in college transfer to work because the student has learned how to learn. This ability enables continued learning, adaptation and integration of abilities, and further learning within a particular job situation and across situations and positions.

### Finding: Self-Sustained Learning That Links Knowing and Doing Is a Causal Element in Integrated Performance

We have learned that (1) growth occurs during college as the result of a particular curriculum, (2) this growth includes increasingly sophisticated moral and intellectual mind sets as well as integrated performance of interpersonal and intellectual abilities in situations, and (3) individuals may nevertheless recycle through less sophisticated forms of thinking when confronted with new decisions and situations. Education seems to make a difference in development of personal growth and integrated performance for both Alverno students and alumnae, as well as practicing professionals in management and nursing.

But what learning processes account for these outcomes? What kind of learning yields integrated performance of intellectual and interpersonal abilities, particularly at work?

To answer this question, we turn to longitudinal interviews of student perspectives.[5] The following description is adapted from Mentkowski (1988).

#### Self-Sustained Learning in Students

The interview analysis found that learning as described by students was a process of experiencing, reflecting, forming new concepts, and testing one's judgment and abilities in action. Two aspects of learning that students described seem to be characteristic of a traditional liberal arts education: (1) Students are taught to be objective and to stand back and reflect on their experience; and (2) They are consistently exposed to opportunities to form new concepts, complete readings, and attend lectures on theory. But these students also came to realize that hands-on experience is critical for learning. They also avowed that using new knowledge is necessary to really learning it and that one must test new-found skills. From the students' perspective, these elements fit together as a process that describes how they learn. That process undergirded the self-sustained learning necessary for effective performance at work.

[5] We gathered perception data through a confidential, open-ended interview ranging up to three hours in length, guided by a protocol of questions and probes (Much & Mentkowski, 1982, 1984). Because this measure is lengthy and complex, both to administer and to analyze, we selected samples for interviewing from both longitudinal and cross-sectional study populations. The *results here reflect* over 320 interviews from 82 students who provided interviews at one-year intervals at the end of each year in college, and again, five years after college. In all, 461 interviews were collected and transcribed from 129 participants. Interviews from traditional-age students and those from alumnae have been analyzed so far.

**SELF-SUSTAINED LEARNING: STUDENTS**

Learning is:
A process of experiencing,
reflecting,
forming new concepts, and
testing one's judgment and abilities in action.

One student, "Andrea," described this process: "By learning something and going and applying it, you can find out what worked for you, what didn't, what you really don't understand, and then you can go back and question. Or in learning new theory, you can apply, you can think back to the clients you have had or the situations you were in and say, 'If I had known that then, it could have helped me a lot.' So I think the application and then going back to theory and questioning helps make it more solid in your mind—you can understand it better."

### Changes in Student Learning Styles

Thus, our student interviews independently confirmed Kolb's (1984) recent description of the learning process as experiencing, reflecting, forming new concepts, and testing one's judgment and abilities in action.[6] Further evidence from Alverno longitudinal studies of student changes in personal growth are the dramatic changes appearing in students' orientation to learning styles, using Kolb's Learning Style Inventory (1976). At entrance, both younger and older students showed marked preference for *concrete experiencing* over *abstract conceptualizing* and for *reflective observing* as against *active experimenting*. In the first two years, they moved rapidly toward a more balanced pattern: By the second testing, they had come to rely equally on concrete and abstract modes and to show a similar flexibility in choosing either a reflective or an active approach. Additional analyses revealed that students who showed high achievement in the curriculum changed more and that when age, pretest scores, and other variables were controlled, the curriculum still accounted for change. Overall, achievement in the curriculum had a greater effect than age on changes in learning style preferences.

These results provide another clue that certain kinds of learning may be related to integrated performance. They also suggest that experiential learning is an important curricular element (Doherty, Mentkowski, and Conrad, 1978; Mentkowski, O'Brien, Cleve, and Wutzdorff, 1983). But *which* elements of the curriculum matter?

### Curricular Elements Most Important to Self-Sustained Learning

To what curricular elements do students attribute "learning to learn"? The interview analysis identified three major components that describe the development of this process of learning to learn: *taking responsibility for learning, making relationships among abilities and their use,* and *using different ways of learning.* Figure 3 illustrates the learning outcomes and the curricular elements to which students attribute the development of their learning-to-learn skills.

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[6] Kolb derived this experiential learning theory from theories by Lewin, Dewey, and Piaget and has researched it in part through measures of learning style.

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**Figure 3. Student Learning Outcomes and Their Causes as Attributed by Students**

| STUDENT ATTRIBUTED CAUSE | | STUDENT OUTCOME |
|---|---|---|
| Instructor attention and empathy, feedback, Self-assessment | ——————> | Taking responsibility for learning |
| Experiential validation, Instructor coaching, Professional application, integration of abilities | ——————> | Making relationships among abilities and their use |
| Practice, Feedback, Modeling, Peer learning | ——————> | Using different ways of learning |

Note that one of the more prominent causes gleaned from the interview examples is *experiential validation*, having to apply abilities within and across courses, demonstrating them on assessments and during internships, and using the abilities in multiple settings. This may be a curricular element essential for integrated performance. Further, feedback and opportunities to self-assess experienced in Alverno's ability-based performance assessment process, led to *taking responsibility for learning*, for *learning to learn* and *assess on one's own*.

## Coming to Value Liberal Learning

While students are showing development of self-sustained learning, how do we know that students *value* learning? Does learning become part of their value system? And do students' professional values include the kind of learning that would support integrated performance?

Student interview data confirm that students' commitment to personal, career, and professional values developed throughout college. There is also an important performance dimension to commitment: students consistently gave examples of how they were acting out of their personal and professional value systems. Like their understanding of learning, their understanding of their own commitment developed throughout college, and they show more and more sophisticated behaviors that match their increasingly internalized goals and values.

Students also consistently broadened the settings in which they described themselves using their abilities. As they progressed, they cited instances from work, family, and other environments as often as their in-class assessments. This is a sign that they also have cognitively made the transfer that they claim to have made experientially. Through experiential validation of their abilities, students were able to construct a justification for liberal learning in which personal growth and effectiveness mediated between educational experience and concepts of professional role performance. Thus, there is reason to believe these students' valuing of liberal learning contributed to their capability for integrated performance.

## Self-Sustained Learning in Alumnae

Though students integrated learning performance, do two-year alumnae continue to show self-sustained learning after college at work? Do they value learning on the job? While Argyris and Schon (1974) have described the importance of a theory of action in effective performance and McClelland (1975) has shown that abilities are a basis for effective role performance, researchers and educators still must demonstrate how this happens. Educators want to know how and why abilities are developed so they can foster them in college. As we analyzed our 32 alumna interviews, a picture of active, self-sustained learning began to emerge as it was

practiced at work. Several components of learning to learn characterized alumna behavior: (1) Learning is a continuous process. Alumnae regarded learning opportunities as motivating career development and job choice; (2) Learning to learn for alumnae means to *tie knowledge, theory, and experience to productive action* and to *put these elements together in new situations*; (3) Alumnae *apply abilities in action, get a response, and adjust* performance or ideas accordingly; (4) Alumnae *show integration and adaptation of abilities* based on the experience of *observing, thinking, retrenching;* and (5) Central to self-sustained learning is *thinking and performing in particular settings and situations.*

**SELF-SUSTAINED LEARNING: ALUMNAE**

Experience learning as a continuous process

Tie knowledge, theory and experience to productive action

Apply abilities in action, get a response, and adjust accordingly

Integrate and adapt abilities

Think and perform in context

Following are preliminary descriptions of what we have categorized as developmental, acceptance, and credentials orientations to learning, based on interviews with five-year alumnae, using the Alumnae Perspectives Interview (Mentkowski & Much, 1980, revised 1985; Deemer & Mentkowski, in progress). These are value constructions that seem to underlie the way alumnae orient themselves to continued development and adaptation of their abilities at work.

We are currently analyzing interviews for learning, confidence, self-assessment, reflection, and adaptation outcomes. So far, there seem to be differences evident in the way some individuals think and feel about learning.

A key difference in the orientations revolves around what individuals hope to achieve through learning and what they value. A person demonstrating a *developmental orientation* is intrinsically invested in a performance and its outcomes. In contrast, a person demonstrating an *acceptance orientation* is invested more in the secondary outcome of social acceptance. The *credentials orientation* is also tied to secondary outcomes derived from the performance, in this case the potential for career mobility, salary and status.

Needs addressed through performance are clearly not orthogonal and the outcomes are not viewed as mutually exclusive. Most, if not all, individuals were concerned about tangible achievements; they valued their social relationships. These issues were not absent in the discourse of individuals with a developmental orientation. However, the weight or centrality of these issues seemed to vary; it influenced how individuals construct learning situations.

The orientations depict what seem to be an underlying motivator for the individual but may be domain specific in its expression. For example, persons may be developmentally oriented in their civic involvements but engage in paid employment for financial reasons. For this reason the centrality of the domain(s) of action for such persons may be a necessary preliminary discrimination in uncovering a *developmental orientation.*

Similarly, the *acceptance orientation* may be contingent on context for its expression, i.e., caring about what particular people think about her performance. Although the orientations are played out in specific contexts—an observation that impacts our ability to see evidence of the orientation—they are thought to reflect a central source of drive and a central way of constructing meaning that influences their continuing construction of learning situations.

In the *developmental orientation*, learning is intrinsically valued and enjoyed. Opportunities to learn and experience new situations and challenges are viewed positively as promoting self development. The learner regulates her involvements where possible, setting realistic goals within the framework of her values and interests. She assesses her performance in terms of the outcomes of the performance itself and its impact on the situation. The learner seeks constructive feedback to improve her performance. Her self worth is not contingent on her performance. Embedded in this orientation is a sense of personal agency emanating from the individual. She seeks out opportunities, is futuristic in her thinking, acts proactive, and demonstrates an internal locus of control. She shows confidence, self-respect, and ability to express herself, but also sees learning as a collaborative venture, and personal relationships may provide additional motivation. She shows an ability to make relationships and to engage in independent learning.

In the *acceptance orientation*, learning is oriented toward significant others in the situation, and their expectations. Meeting these expectations and receiving approval from others is critical to feelings of self worth. The learner is oriented toward concerns about looking incompetent, and losing others' respect as a result. This learner thrives on recognition and feelings that others are proud of her. Self doubts, unrealistic goals, and working to please, with less regard for personal cost, may result in manifestations of stress.

Her orientation is to just "getting work done" done when approval is not at stake. The feedback of others is given more weight than the learner's own assessment of performance, and may be seen as a threat to validation by others, or as a means to figuring out how to achieve recognition. This learner may be motivated by threats and intimidation as well as more positive expressions of pride. Also embedded in this orientation is an inability to make relationships between the performances expected of her and how her performance serves her own needs; she may sacrifice her own development to give others what she perceives they want.

In the *credentials orientation* learning is motivated by ideas of advancement. It is an instrumental sacrifice maintained through discipline. Thus learning activities are cast as something one has to do, not what one wants to do. This learner uses feedback to determine whether her performance will be acceptable and what she will need to do to improve. She completes learning activities through self-discipline, driven by anticipated career, status, or financial rewards.

While we do not yet know how these value orientations to learning characterize our alumnae as a whole, our current longitudinal interviews, from entrance to college to five-year alumnae, will enable us to determine what value frameworks alumnae use at work, particularly in relation to self-sustained learning (Deemer & Mentkowski, 1990).

In sum, college learning and abilities form a foundation for role performance after college, but learning to learn is a prerequisite to adapting abilities in a given role one has. Self-sustained learning is a process that enables adaptability to multiple settings; it enables students to perform abilities learned in college, later at work (see Figure 4). Thus, this study of alumna and student interviews suggests another kind of integration, between knowledge and its use.

**Figure 4. Learning to Learn Links Education and Work.**


Linking Knowing and Doing for Integrated Performance

The relationship between knowing and doing intersects the central issue of whether integrated performance will continue to accrue for the individual as the result of participation in a setting other than college. From our initial study of student and alumna interviews, it seems that integration not only of intellectual and interpersonal abilities but also of thought and action in a particular context is key to a sustained pattern of growth and change. If we center our educational strategies so that they consistently ensure relationships between knowing and doing, we are more likely to effect an integration between thought and action that will generalize to a variety of situations, including those that call for integrated functioning within a framework of values.

In a later section, we examine whether individuals taught in this way continue to act responsibly in organizations. There are enough examples in the interviews we are analyzing in our current five-year follow-up study to indicate alumnae are doing so. The link between thought and action, between knowledge and behavior, seems to develop during college and develop further afterward. More important, it seems to be a central building block in the glimpses of integrated performance we have seen so far.

Our study of managers and executives also confirmed the importance of knowledge linked to action. We researched abilities through performance interviews and a perceptions inventory. We also asked participants for their perceptions of what outstanding professionals *should* do. Managers were invited to judge a range of performance characteristics. We found that effective managers generally performed abilities they independently judged as characteristic of outstanding performers. The findings also allowed us to identify those abilities that professionals did not demonstrate but identified as important—such as negotiating and networking in management—thus signaling abilities that should be part of the manager's repertoire. Other abilities, such as demonstrating self-control and using socialized power, were more important for effective performance than the managers realize. However, the fact that we found this congruity between perceptions of managerial abilities and actual performance is evidence that the managers in this study had another element critical to the development of integrated performance—and thus, to sustained learning—i.e, knowledge reflected in action.

Thus, application of abilities cannot be left to chance in professional school education. Traditional curricula have emphasized development of knowledge over action, just as they have emphasized intellectual abilities and ignored interpersonal ones. A curriculum should stress *using* abilities across multiple settings, and this kind of performance can be assessed (Loacker, 1991). A curriculum should also incorporate the fact that increasingly complex performance develops in concert with gradually more sophisticated modes of thought. Results from all three data sources—students, alumnae, and professionals—confirm that the integrated performance of abilities is a developmental, learned process that needs systematic teaching and opportunity for practice, but can be assessed in the workplace through in-depth interviews of graduates' perspectives.

Therefore, we recommend the following:

> Recommendation #4. A national assessment system should assess self-sustained learning and should include feedback and opportunities to self-assess.

## IMPLICATIONS, ISSUES, AND QUESTIONS

One implication that follows this recommendation is that different kinds of measures will be needed to adequately assess self-sustained learning. We discerned self-sustained learning both from perspectives interviews, which are about the way individuals construct concepts, orientations, and values about learning, and from performance interviews, where individuals recall events when they were demonstrating their abilities.

• How assess self-sustained learning? Is it feasible?

Our experience suggests that performance interviews (e.g. Behavioral Event Interviews described later) are effective in measuring some components of self-sustained learning, such as the ability to self-assess, but that other kinds of indepth interviews of how the individual constructs learning are needed to adequately measure transfer of self-sustained learning beyond college. Thus, it is a combination of modes and methods that leads us to a clearer picture of self-sustained learning.

Is the measurement of self-sustained learning feasible? Currently, we are using computer programs to assist with the content analysis of interview text; but until these approaches are more well-developed, sampling is recommended as a concession to feasibility issues. However, the performance interviews do get at some components of self-sustained learning, including self-assessment. Since self-assessment is such an important element that fosters self-sustained learning, some of the more complex elements are dealt with, using the less feasible perspectives interviews.

The U.S. Department of Labor (1991) report, "What Work Requires of Schools," also notes the importance of measuring *Knowing How to Learn (uses efficient learning techniques to acquire and apply new knowledge and skills)*. This ability is considered an important part of the foundation for performing effectively at work. Understanding how important it is to include this ability will certainly keep sustaining us in our search for more feasible measures. We have worked to develop a Student as Learner Inventory that asks students to judge how characteristic various elements of self-sustained learning are in their approaches to college learning. (This is discussed in Loacker's (1991) position paper.) This is a way to identify changes in student perspectives during college that also generates feedback to students. It gives faculty a way to intervene in learning to learn skills early in a student's college career.

• How assess for integrated performance?

We return to this issue, which emerged in the last section. Again we find the need to measure multiple components of abilities in situations. Here we find still another elaboration of integrated performance: linking knowledge to action that generalizes to a variety of situations. We recognize the complexity of this question. In Learned Principles 5 and 6, we turn to more developed descriptions of our work in assessing post-college performance, in an effort to lay out methods that deal with this issue.

• How give feedback and opportunities to self assess?

The systematic measurement of all of the components of self-sustained learning is generally less feasible than the measurement of other complex abilities. Our experience with indepth perspectives interviews and performance interviews suggests that eliciting full descriptions of self-sustained learning requires patient, interactive interviewing. Nonetheless, there are pedagogical reasons for conducting reflective indepth interviews of participants' perspectives. By providing a reflective opportunity for the participant, they can address some of the concerns about how a national assessment system could efficiently give effective feedback. At the end of an interview, the interviewer would be in a position to give some feedback on abilities that were described. Interviewers could be trained to assist participants to self-assess. At the end of an interview, an interviewee would be in the position to think broadly about how abilities are related to the interviewee's current goals. Thus, the "feedback" occurs *at the time of the interview*, so there is no need to go to the expense of creating or delivering individual feedback to the interviewee at some future time. Our students and alumnae have often commented that these performance and perspectives interviews have led them to self-insights, because just participating in the interview gave them a chance to self-assess. When we ask participants to generate abilities that they feel are important, we have found that they are able to do this and that this helps bring the interview to effective closure. Using a reflective (perspectives) interview in a national assessment system would broaden this process, enabling participants to generate their own learning from their contribution to a national assessment system.

Principle Learned #5. Comparing faculty-defined abilities to those demonstrated by outstanding professionals enables faculty to identify abilities students need for particular professions.

Along with Alverno College, educators and researchers in a wide range of professions (business, industry, government, military, and health professions) have sampled work performance as an efficient tool for curriculum development. This approach represents an important expansion of method, for educators developing curricula and identifying abilities have often relied extensively on their broad expertise or on their supervision of students who are encountering professional settings. In reviewing content, faculty typically use literature reviews to extend their perspective on professional development. Such reviews tend to include a knowledge foundation of the profession, and may address technical entry level position requirements, but may not be sufficient to prepare the individual to function effectively across professional settings or across increasingly complex professional positions (McClelland, et al., 1990, Appendix D).

On the other hand, performance interview accounts enable curriculum developers to: (1) identify abilities with enough contextual information to support educational interventions (Flanagan, 1954; Klemp & McClelland, 1986), (2) link curriculum development to the abilities that are most critically associated with continued effectiveness in the profession (Boyatzis, 1982; DeBack & Mentkowski, 1986; Klemp, 1988; Mentkowski, et al., 1982), and (3) develop communicable examples of professional and liberal arts abilities and values that can transfer across context (Stark & Lowther, 1988).

Usually, educators sample work performance through some kind of interview that asks the person to recall an incident or event. The goal is the identification of abilities or competences that make for effective or outstanding performance. Direct observation is usually deemed both inefficient and too costly for several reasons. First, the object is not a task analysis that contributes to job descriptions. One can observe someone working over a long period of time without discerning an event or incident that would call up essential abilities, or abilities that are critical for effective performance. Further, direct observation often fails to sample the context for a behavior adequately. (For example, is heroic resuscitation life-saving or counter to a living will?)

Flanagan's (1954) Critical Incident Technique (CIT) and McClelland's (1978) Behavioral Event Interview (BEI) have been used to identify abilities for the professions. Although CIT is widely known for its effective application in establishing performance requirements for certification and licensure (e.g. Hubbard, Levit, Schumacher, & Schnabel, 1965), examples of the application of CIT and BEI to curriculum development, are not as widely available (Wilson-Pessano, 1988). We are not aware of any institution except Alverno that uses the method for post-college studies of alumnae.

Nevertheless, researchers from diverse institutions and professions have used these two related methods in long-term curriculum-embedded studies designed for improvement. They collected events that stood out to interviewees as examples of more or less effective performances. The CIT yields events that are relatively bounded in scope in order to support the sorting of events into unique categories of performance (cf. Fivars & Gosnell, 1966), while the BEI yields events with more elaborated descriptions of the thoughts and feelings of the interviewee at the time of the event in order to support the coding of performances for contextually demonstrated abilities (Boyatzis, 1982; Mentkowski, et al., 1982; Rogers & Reisetter, 1989). Analysis of the BEI may be supported by either an interviewer's summary write-up based on notes and review of the taped interview (Finch, Gregson, & Faulkner, 1991) or else by a write-up that organizes the participant's transcribed description into an event sequence (Rogers & Talbott, 1990). While there are a number of applications of this method in the United Kingdom (e.g., Bradshaw, in press); two examples in the United States illustrate the application of these methods.

The Institute for Health Care Research in the American Institutes for Research (Wilson-Pessano, 1988) used the Critical Incident Technique to collect descriptions of effective and ineffective parental asthma management behaviors to establish objectives for an asthma management education program. Analysis of 574 reports from physicians, other health professionals, and parents yielded 130 distinct ineffective and effective asthma management behaviors, which were organized in five major areas of responsibility—symptom intervention, symptom prevention, use of medical and educational resources, communication among caregivers, and child development and family relationships. Analysis also revealed the knowledge, attitudes, skills, and specific behaviors needed by parents to carry out these responsibilities.

Priorities for the curriculum were established based on the relative importance of the identified behaviors to control of symptoms, safety of the child, and overall well-being of the child and family, as well as the likelihood that parents would have difficulty carrying out the responsibilities without educational assistance. Careful consideration was given to the choice of techniques to develop each parental ability, including specific behavioral change techniques (eg. self-monitoring, performance feedback, behavioral contracts), "job aides," and videotape components to address specific didactic problems or as triggers to discussion of emotional and attitudinal issues. Nurse-educators were involved, with educational specialists, in all stages of the development of the program. By focusing on the instructional objectives to be met, pretesting the educator's "script" and teaching activities, and assessing the effects on parental behavior, the educators practiced and thereby developed a much broader repertoire of skills in patient education than they previously possessed. The resultant program is currently being evaluated in a randomized control clinical trial to determine its medical and other effects on children and families.

The Virginia Tech Office of the National Center for Research in Vocational Education (Finch, et al., 1991) used the Behavioral Event Interview to establish curriculum content for leadership development as part of a four-year project. Project goals were to identify leadership attributes for vocational education administrators and then to develop resources for preparing successful administrators. Analysis of 272 events from 39 vocational administrators and 78 instructors across seven states was conducted concurrently with data collection in order to facilitate both data collection and analysis (cf. Lofland, 1971; Miles & Huberman, 1984). Thirteen types of events were identified and an existing leadership framework and a set of leader attributes were verified and elaborated (Finch, et al., 1991).

After reviewing the needs of the profession and existing training resources, two resources were developed. One was a set of case studies that provide users with opportunities to explore alternate actions and solutions to problems (the case studies are organized into the 13 functional groups; the content is drawn from interview-based write-ups that include supporting contextual information). Second, a simulation was created that provides participants with opportunities to utilize and assess their leadership capabilities as they assume administrative roles. The attempt to create a simulation also led the developers to adapt the BEI to the simulation. Vocational administrators were also asked to provide crucial events that demanded their full attention. The CIT was then used to efficiently gather additional vignettes in order to supplement stimulus materials for the simulation.

As mentioned earlier, the Office of Research and Evaluation at Alverno College has also conducted a number of studies using the Behavioral Event Interview to support the development and validation of an ability-based curriculum that includes performance assessment.

### Finding: Faculty-Defined Abilities Relate to the World of Work

Results from studies of outstanding professionals in nursing and management were described earlier. The following study, using similar methods, involved Alverno faculty directly in interviewing and analyzing the information to find out how the abilities they defined relate to the workplace (Schall, et al., 1984). Eighteen faculty and staff from 13 disciplinary and professional areas conducted 134 performance interviews and also used elements of the Job Competence Assessment Process.[7] (See Appendix E.) Seventy-three professionals at the managerial level across 66 Milwaukee area organizations completed the interview and a Performance Characteristics Inventory (McBer, 1984). Organizations represented the following work environments: Agricultural Products, Business and Other Services, Communications, Education, Entertainment, Finance, Industrial High Technology, Manufacturing, Public Utilities, Real Estate, Transportation, Wholesale, and Retail.

In the study, faculty and staff identified abilities professionals used and characteristics they perceived as necessary for their work, and related them to abilities taught in the Alverno curriculum. Professionals interviewed spoke from a specific job context (i.e., a particular job performed within a given career field and type of organization), thus enabling faculty and staff to establish direct relationships between abilities taught and those performed at work. Results provided a catalog of abilities that were identified by area professionals as critical to success in a variety of career paths, were demonstrated on the job, and were related to abilities taught at Alverno.

A second finding was that type of organization influenced the kinds of abilities coded from the interviews. For example, a greater number of professionals from high technology environments reported developing others and showing positive regard for employees, while professionals from manufacturing and agricultural products

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[7] Job Competence Assessment Process. In the Alverno studies, we adapted Job Competence Assessment, a more extensive technology that includes the Behavioral Event Interview. As noted earlier, research has effectively linked this assessment technology to curriculum development in college and professional schools. McBer and Company (Appendix E) (McClelland; 1976; McClelland, et al., 1990; Boyatzis, 1982;) and Cambria Consulting (Klemp, 1982) have effectively used the methodology to create training in various organizations and also to create a performance appraisal system that includes the Behavioral Event Interview. In fact, performance appraisal systems are redesigned based on the criteria and abilities identified through initial Job Competence Assessment studies of outstanding performance in the workplace. The Job Competence Assessment Process (Appendix E) is designed to identify competences that are not only related to effective performance, but that cause effective performance. Competences are characteristics of persons who are effective, although McBer recognizes that individual competence must be considered within a system that includes the person, the job, and the work environment within which the two interact. Basically, the method involves defining performance effectiveness criteria, and choosing a criterion sample (e.g. peer nomination, customer ratings) to distinguish outstanding and good performers. These individuals are interviewed with the Behavioral Event Interview (McClelland, 1978), which is coded for competences in order to create a competency model of effective abilities. In a Performance Characteristics Inventory, these participants rate a series of abilities and skills as relevant, critical for outstanding performance, and essential for selection and training of new employees.

industries seemed to rely on demonstrating a concern for impact and proactivity. While the high technology manager was interested in bringing people along within the organization, and believed that people can improve, the manufacturing and agricultural manager focused more on the image or reputation of self or business, and made being a resourceful initiator a top priority. This people orientation on the part of high technology managers was interpreted as reflecting a more advanced orientation to "Total Quality Management," and supported faculty efforts to define abilities in ways that reflect future as well as current position responsibilities.

The most important finding from this study may have been that the researchers could relate faculty-defined abilities to all categories of abilities coded in the interviews: socio-emotional maturity, entrepreneurial abilities, intellectual abilities, and interpersonal abilities. This was some verification that broad abilities which Alverno graduates must demonstrate were similar to those that professionals report using and perceive as necessary for their work. This argues again that complex abilities are integrated and performed in context, and that a single situation may elicit a number of abilities simultaneously.

### Finding: Five-Year Alumnae Performances Relate to the World of Work

Five-year alumnae in management, nursing, and other professional areas described performances in these areas as well as in a personal activity (e.g., child rearing, graduate learning, volunteering). A generic taxonomy (Appendix C) of 29 alumnae abilities was developed, based on a synthesis of previous studies and curriculum-defined abilities (see Appendices A, B) and the coders' attempts to capture what stood out in the performance examples.

Alverno researchers also developed codes for dynamic settings (eg., system level failure, values conflict, development of others, interpersonal conflict) in order to relate the broad context of the performance to the curriculum. Case examples were organized around abilities associated with most effective alumna performance, as well as by four of these dynamic settings that are common across professions. Write-ups of these now provide students with case examples of performance that they can discuss in relation to both liberal arts and professional abilities. Transferability of curriculum abilities to new settings is demonstrated to students through the juxtaposition of alumna performances that have similar dynamic settings, but different levels of effectiveness and different professional settings.

This experience suggests the following recommendation for a national assessment system.

> Recommendation #5. The method that some educational institutions and consulting firms use to measure abilities in the workplace to improve student and employee performance can be used as a strategy in a national assessment system.

## IMPLICATIONS, ISSUES, AND QUESTIONS

The recommendation suggests that the performance interview method can be used to sample abilities after college, in context, as well as for identifying abilities.

There are several implications for designing assessment. First, researchers and educators agree that the performance interview technology should be used to assess performance in context and assess those abilities that a person uses to guide performance across a range of situations (e.g., "theory of action," Argyris & Schon, 1974). Further, the interview provides the link between abilities and behaviors that are critical elements in identifying developmental criteria for assessing performance in context; that is, in situations where we expect the person assessed to create or construct a response that may differ for every individual. Because these abilities will be causally related to effective performance, faculty and employers can use the information generated both for improvement and accountability purposes.

• Can the method assess abilities in college and at work?

The Behavioral Event Interview method has been adapted successfully in college as a systematic way to assess abilities related to success in college and life. In the Student Potential Program developed by the Council for Adult and Experiential Learning (CAEL) with the assistance of McBer and Company and with funding from the Ford Foundation, 15 institutions participated in a study of the method as a way to assess behavior patterns not measured by standardized paper and pencil tests (Council for Adult and Experiential Learning, 1986). An evaluation conducted by the Higher Education Research Institute (Astin, Inouye & Korn, 1986) found that the Student Potential Program interview (the Behavioral Event Interview approach adapted for CAEL use) has a significant degree of construct validity, and adds significantly to the multiple prediction of traditional admissions measures, suggesting that the Student Potential Program (SPP) is measuring relevant academic abilities not measured by traditional criteria.

Alverno participated in the CAEL study. As one outcome, the education faculty currently use the measure as a strategy for measuring the Education Department's abilities (Diez, 1990; cf. Appendix B) as an outcome measure after a student's first and second field experiences, and as an entrance assessment for the student's third and fourth field experiences. The method has also been developed as an in-class assessment accompanying student internships (Mentkowski, et al., 1983).

This is some evidence that the measure can assess abilities in college, supporting its use both in college and at work. This argues that performance samples could be collected using the same strategy. Further, the studies cited earlier using the method in the workplace confirm the feasibility of use in the workplace.

• How sample faculty/institutions to build the research base for creating abilities?

All of the studies cited in this section suggest these kind of studies could be "sampled" to build a broad set of abilities. Clearly, there are questions about the degree to which any set of abilities and the attendant developmental performance criteria would adequately represent those that institutions would claim as outcomes for their graduates. But there are enough collaborative efforts that suggest that such an effort is possible at both the disciplinary and professional level (Association of American Colleges, 1991; Loacker, 1991). On our own campus, we are currently coordinating a Kellogg grant involving 11 institutions that span high school through medical school curricula; the institutions share abilities to investigate whether we can build a sequential set of abilities that reflect levels of education.

• How feasible is it to follow graduates after college?

Literature sources such as ERIC and Social SciSearch show few if any citations regarding formal study of post-college employment experiences or performance in relation to curriculum. Beyond graduate follow-up on surveys, institutions may use a variety of methods to monitor their graduates' post-college experiences as a means of program improvement. Often this is informal in nature and is seldom published even in the form of technical reports. The potential flow of information back into programs occurs naturally and informally whenever there are practical fieldwork or other clinical experiences and an institution's graduates are entering the supervising agencies (e.g. schools, hospitals, businesses) that provide placements. Professional schools in both undergraduate and graduate schools, because of their responsibilities to a well-defined market and to the fulfillment of a public trust, are more likely to seek and receive information about their graduates informally and through systematic studies. (Locally, at least four colleges, Alverno, Cardinal Stritch, University of Wisconsin-Milwaukee and University of Wisconsin-Whitewater carry out mentoring and first-year teacher support programs that indirectly serve teacher preparation curricula.)

• How feasible is it to assess for graduates' performance at work?

Admittedly, post-graduate assessment of actual performance in the workplace as a measure of college outcomes presents many challenges. As Galluzzo and Craig (1990) point out in relation to teacher education, a wealth of relevant information about preparation can be collected as teachers enter practice, but, they predict, many institutions will be reluctant to use such data if it is used only for accountability purposes. In practice, many individual and contextual factors can confound the interpretation of training impact. Data to be used for improvement often needs to provide additional information than that used for traditional accountability frameworks (e.g., accreditation); and institutional supports that integrate evaluation data into program improvement are seldom more than cursory.

The research of Adams and his colleagues completed in the early 1980's, stands out for its use of longitudinal follow-up studies. Ayers (1986) also produced some singular work involving longitudinal observations o developing teachers, in practice, as an evaluation model. Galluzzo and Craig (1990), however, point to several factors that limit more effective use of evaluation measures, including resistance to measuring performance once graduates leave the institution. As meaningful as such efforts may appear from the perspectives of curriculum development and educational policy, little use seems to be made of them because of their lack of sensitivity to individual and contextual factors that influence performance at work. Institutional commitment to substantive evaluation structures is also an issue.

In medical education, the precedents for assessment of performance following education have been stronger. Indeed, medical schools seem to take a much more active role in following up graduates than some of the other professions (Miriam Friedman, personal communication, September 1991). Relationships between medical school performance and post-graduate competence have been investigated both generally (i.e., to predict success in clinical practice) and for specific program evaluation (Gonnella & Hozat, 1983; Gunzburger, Frazier, Yang, Rainey, & Wronski, 1987; Veloski, Herman, Gonnella, Zeleznik, & Kellow, 1979; Woodward, 1984; Woodward & Ferrier, 1982; Yindra, 1988). Different forms of performance assessment have also been explored as a basis for targeting training support to improve practical skills (e.g., Norman, Tugwell, & Feightner, 1982; Norman, Neufeld, Walsh, Woodward, & McConbey, 1985; Finkel & Norman, 1973).

• What are barriers to using information about graduate's performance at work back on campus?

What are the barriers to using back on campus, information from assessment at work? A potential question posed by college and university faculty and administrators is: "To what degree will we be held accountable for graduates' performance in the work place, when that performance may be more influenced by the context in which the graduate is working than by the education that the graduate received in college?" How long can faculty be expected to be held responsible for graduates' performance? One year? Five years? How does one sort out the effects of context in the performance of graduates, so that performance can be fairly attributed to a curriculum the graduate may have experienced earlier?

More recently, Dinham and Evans (1991) make the case that measures such as accreditation standards are far too limited to provide adequate evaluation back to schools. Measures that move beyond the curriculum—such as post-college performance—are necessary to provide adequate support to institutional improvement.

Thus, two important elements of post-college studies are important to establish. The first is creating a context for post-college assessment that makes public a shift from assessment as information for accrediting or demonstrating accountability, to also using assessment as information for improving curricula.

Second, post-college studies should provide information on the definition of abilities as well as of performance criteria. Currently, they provide information for the "What abilities should we be teaching?" question more than the question "What criteria enable us to judge these abilities in performance and distinguish effective performance?" Performance data on graduates should link the conceptualization of the abilities and assessment. The resulting refined abilities will reinforce connections between instruction and assessment.

• How can performance at work be linked to college instruction?

Another issue has to do with the relationship between assessed performance and instruction. How can performance in the workplace be linked to instruction in college? Unless the information from post-college studies relates directly to instruction, some faculty reason, how can it really help improve one's teaching?

• How assess for performance-in-context?

What is critical? How do we assess performance-in-context after college in a way that facilitates the analysis of what should be taught in college? Once faculty are teaching for abilities that are expected to transfer, part of their interest is in the performance of those abilities in context and in the opportunity to assess it to see whether students have internalized the abilities and can perform them in a range of situations. This is one of the arguments for the traditional emphasis in professional education on student teaching, nursing clinicals, and opportunities for practice in on- or off-campus "laboratories." Faculty are only too aware that abilities are not likely to transfer unless the student can perform in context.

Thus, assessment of students in context is already built in to most professional school curricula. Once an improvement agenda is welded to post-college assessment of graduates, faculty and administrators are likely to rely on performance-in-context as the kind of evidence that is critical for determining whether graduates are actually transferring college learned abilities to work.

It would be unfortunate if post-college assessment of graduates would be used only for decisions on accreditation of professional programs. Administrators or faculty will hardly want to open themselves up to accountability demands that stem from lack of performance in situations in which they—or their graduates—have little if any control.

Again, one interesting observation from our studies of alumnae is that when graduates found themselves in situations where they could not perform their abilities—that is, where the kind of work situation was not conducive either to demonstrating their competence or to further learning—they began to look for other positions, and changed jobs. This finding argues that it is critical for college students to develop independent self-sustained learning that provides them with the independence and skills to exit work situations that they cannot change. It also suggests that assessments of graduates after college should incorporate ways to define and judge the context in which they are working, for the degree to which the context calls for or undercuts the performance of the abilities being measured.

Principle Learned #6. Complex abilities that connect education and work—including self-sustained learning—can be assessed in graduates' work performance in a variety of professional contexts. Some abilities can be linked to college learning, and some distinguish effective performance at work.

How and to what degree does the college graduate contribute to effective performance at work? Pascarella and Terenzini (1991) have summarized the research on how college affects student outcomes during and after college. Considerably less research has addressed the long-term effects of college than has addressed the first-order question of what impact college has on the student while still at college. Although the evidence is spotty in some domains, Pascarella and Terenzini concluded that college results in long term gains in learning

and cognitive development, attitudes and values, psychosocial changes, moral development, and socioeconomic outcomes, as well as in gains in quality of life. Surprisingly little research has directly addressed the question of how on-the-job performance of the college graduate makes a contribution to conceptualizing the work to be done or moving projects to effective completion. Does level of education distinguish effective performance?

### Finding: Level of Education Distinguishes Professionals' Effective Performance at Work

In our studies of professionals in the work place, we found that some abilities were developed more through education than experience on the job. Nurses with a baccalaureate degree were more likely to act independently. They took responsibility for their judgment, or took an advocacy role for another, while at the same time, they showed ego strength by acting responsibly even at the risk of incurring disapproval. The more educated nurses not only demonstrated more influencing (they made more strategic attempts to refocus emotions or to change behavior), but they also exhibited more, coaching which is a more complex behavior because it goes beyond strategic influence when a nurse specifies the direction of behavioral change toward increasing the responsibility of others. The more educated nurses were better at conceptualizing, and showed more reflective thinking. They tended to search for or find greater insights by reflecting on their own behavior, feelings, and beliefs and their consequences. The less educated nurses were more likely to demonstratively fail at conceptualizing by not recognizing relevant relationships or by failing to guide their actions according to relevant higher order principles. They made conceptualizing errors that put clients at risk. Thus, this kind of conceptualizing should be part of any kind of assessment of nursing graduates' performance on the job because it discriminates effective performance.

While level of education was less related to performance for women managers in our study, those who had completed a management training program showed more stamina and adaptability and were more likely to work with others in dealing with subordinates, rather than using their authority via administrative fiat. Those who showed more rapid advancement in their company and most likely a broader range of experience, demonstrated more accurate self-assessment and better-developed self-presentation skills. A more serendipitous finding also emerged. A small group of women executives interviewed communicated a holistic approach to life—as well as to management—that they want to teach and share. We did not set out to measure this, but it struck us that these executives were sure of their commitments and consistently acted out of them. These executives demonstrated integrated performance and involvement and tended to shape their own organizations.

What are the implications for assessment? Given when this study was conducted, many of these successes of these early women executives may be ungeneralizable, because their performances were honed by the experience of making it in management at a time when they were not quite so welcome in the field. Can management graduates today count on a well-defined and sustained education that contributes to integrated performance and to their personal growth? Will such an education really make a difference later, or will only a few develop the potential to contribute to the kind of corporations and organizations that we need in the twenty-first century?

Are there other implications for assessment? Clearly, performance interviews should be accompanied with questionnaires that tap a number of indicators, such as level of education, years of experience, and type and level of position. After all, level of education, for example, did distinguish effective performance at work in studies of graduates from a range of professional programs. These studies argue that assessment of graduates' performance at work should distinguish further among those abilities that should be developed in college from those that are better developed on the job. If faculty and employers are to collaborate in education and training, respectively, it will help to know which abilities should be taught where, to the degree that it is helpful to make those distinctions. Further, if abilities are defined as developmental, then it makes sense that some abilities should be measured during college and at graduation, whereas we would not expect other abilities to surface until the person has had some degree of work experience.

The crucial question may not be how the performance of the college graduate differs in the aggregate from the non-graduate, but how do we characterize the most effective performances of college graduates? When college educators envision their students transferring their college learning to post-college performances, what kinds of post-college performances by their graduates do they expect will make an effective difference?

How do we assess effective performance of college graduates? The formulation of this question has several premises. (1) Faculty have a significant stake in defining what they will be teaching for. (2) Faculty invested in making a difference in the work force or in effective citizenship will need to invest in understanding post-college performances and performance settings of their alumnae. (3) Summaries and examples of most effective performances by graduates can help faculty make the link between abilities learned in school and abilities performed on the job. (4) Faculty can make links between what students are learning in their study of the disciplines in college and the kinds of performances that students make.

Our study of five-year alumnae (Mentkowski, et al., 1991; Rogers & Talbott, in press) demonstrates how the Alverno Alumnae Performance Effectiveness Measure is beginning to give us a picture of how college faculty envision effective post-college performance. The Alverno Alumnae Performance Effectiveness Measure involves several evidentiary steps (see Figure 5) and has much in common with Job Competence Assessment. Both use the Behavioral Event Interview (McClelland, 1978; Mentkowski, et al., 1982; Rogers & Reisetter, 1989) to obtain an indepth description of performance in context. Both have procedures for developing write-ups that clarify the sequence of actions (McClelland, 1978; Rogers and Talbott, 1990) or code from transcripts (Appendix G). The method of determining abilities that lead to effective performance are different, however. Job competence studies have helped generate codes related to effective performance by analyzing the difference between the performances of professionals who have been nominated as outstanding performers versus those who are not. Our alumnae effectiveness study has generated a comprehensive list of codes (Appendix C provides a summary of the codebook's abilities) based upon all of these prior studies and has supplemented these with ability definitions from the curriculum (Appendix B; Rogers and Talbott, 1991). Instead of nominating outstanding alumnae, we coded alumna performances using this comprehensive list of job competence abilities, and then had faculty from a range of disciplinary and professional areas independently sort these performances into levels of effectiveness. We were then able to generate a list of abilities most associated with effective alumnae performance by correlating their coding of abilities with faculty judgments of overall performance effectiveness (Rogers and Talbott, in press). (See Figure 5.)

The faculty's evaluation of post-college performances is not congruent with the stereotype of an ivory-tower academic. Instead, the demonstration of achievement actions is the strongest correlate of Alverno faculty's judgments of effectiveness in post-college performances. Most generally effectiveness is associated with making a positive difference in an organizational context, including developing of others. A relationship to college education seems especially plausible for those alumna performance contributions that are based on conceptualization, diagnostic information-seeking, accurate self-assessment, specialized knowledge, and positive regard for others.

The descriptions of alumna performance generated by the Behavioral Event Interview help faculty conceptualize links between education and work and provide them with examples of post-college performance that they can use to improve instruction and developmental performance criteria.

### Finding: Abilities Can Be Defined That Connect Education and Work

In order to elaborate on our first recommendation, that a national assessment system should assess for abilities that connect education and work, we developed a schematic that sets forth the three abilities specified in National Goal # 5: Problem Solving, Critical Thinking and Communication plus Interpersonal Abilities and Self-Sustained Learning (Recommendations 3 and 4). We then categorized the abilities from the codebook (Appendix C) we have seen demonstrated at work and in service roles by Alverno alumnae (Figure 6). Those abilities associated with most effective performance of Alverno alumnae are also identified.

Figure 5

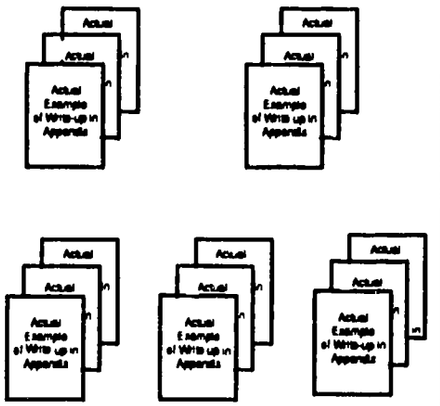
## ALVERNO ALUMNAE PERFORMANCE EFFECTIVENESS MEASURE: DESCRIBING EFFECTIVE POST-COLLEGE PERFORMANCE [1]

### ELICIT ORAL DESCRIPTION OF PERFORMANCE: BEHAVIORAL EVENT INTERVIEW

- What led up to situtation?
- What did you do?
- What were you thinking and feeling?
- Who was involved?
- What was the outcome?

McC: lland (1978)
Mentkowski, O'Brien
McEachern, and Fowler (1982)
Rogers and Reisetter (1989)

### GENERATE "PERFORMANCE" WRITE-UPS OR TRANSCRIPTS OF INTERVIEW



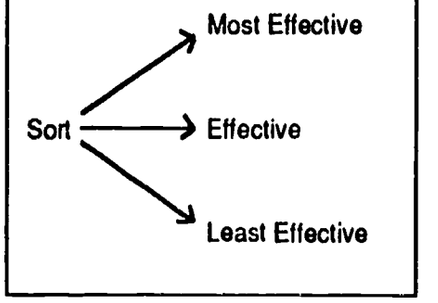
McClelland (1978)
Mentkowski, O'Brien,
McEachern and Fowler (1982)
Rogers and Talbott (1990)

### RESEARCHERS CODE ABILITIES DEMONSTRATED IN PERFORMANCE

Examples of Levels of Criteria:

1. Conceptualization: Identifying and seeing key relationships between key issues while understanding the big picture.
2. Participant generates ideas that meet one of the following broad criteria:
   - Ideas are disparate in time
   - Ideas don't seem to fit together until the concept is brought forward
   - There is distracting or irrelevant information
   - Ideas are systematically coordinated
3. Participant ideas meet specific criteria:
   - Integrates patterns into coherent systems: develops system framework that takes into account available information
   - Sees connections between seemingly unrelated data, problems events, or situations
   - Differentiates an issue, problem, or concept into a set of constituent parts, citing a new concept as the basis for the differentiation
   - Integrates new component into existing framework, while maintaining a coordinate relationship among all components of the framework
   - States assumption or limitations of own framework or more than one framework
   - Uses unusual analogies to understand or explain the essence of an event

### FACULTY JUDGE GLOBAL EFFECTIVENESS OF PERFORMANCE




### ABILITIES ASSOCIATED WITH MOST EFFECTIVE ALUMNAE PERFORMANCE

Achievement Orientation
Achievement Actions
Diagnostic Information Seeking
Use of Socialized/Political Power
Development of Others
Conceptualization
Accurate Self-Assessment
Positive Regard
Diagnostic Pattern Recognition
Specialized Knowledge

[1] Adapted From Rogers and Talbott (in press).

Figure 6.

**Alumnae Performance Effectiveness Measure: Measured Abilities in Relation to National Goals**

| PROBLEM SOLVING | CRITICAL THINKING | COMMUNICATION | SELF-SUSTAINED LEARNING | INTERPERSONAL ABILITY |
|---|---|---|---|---|
| Proactivity | Conceptualization* | Formal Communication | Accurate Self-Assessment* | Positive Regard* |
| Achievement Orientation* | Hypothetical/Causal Thinking | Use of Informational/Expert Influence | Reflective Thinking/Valuing | Sensitivity to Individual Differences |
| Achievement Actions* | Perceptual Objectivity | | Active Development of Self | Accurate Empathy |
| Diagnostic Information Seeking* | Specialized Knowledge* | | | Development of Others* |
| Diagnostic Pattern Recognition* | | | | Expressed Concern With Impact |
| [illegible]ning/Systematic Thinking | | | | Development of Organizational Power |
| Lists Alternatives | | | | Use of Socialized/Political Power* |
| Reflectively Coordinated Practice | | | | Use of Unilateral Power |

Note: Ability categories in the coding system, not related to the National Goals: Self-Control/Emotional Stamina, Ego Strength, Stamina, Spontaneity/Curiosity, Concern With Affiliation, Affiliative Action, Developing or Using Relational Power.

* Ability is associated with most effective performance of Alverno alumnae.

We are now going to take these relationships a step further, building off Figure 1 in "What Have We Learned #1." Now we will attempt to show how we can move from one ability, critical thinking, to specification of developmental performance criteria.

### Finding: Developmental Performance Criteria Can Be Linked to Aspects of Performance that are Most Critically Associated with Continued Effectiveness in the Profession

How abilities are manifested through performance criteria does generally shift from college to post-college performance. For example, Alverno faculty expect that interdisciplinary, general education courses in the humanities will lead students to demonstrate a range of behaviors characteristic of a critical thinker, and that these behaviors can be seen as developmental performance criteria. Faculty experience in teaching for and assessing for critical thinking has led to specifying these criteria as developmental. For example, students will first demonstrate systematic thinking, then critical self-consciousness of the thinking process, and ultimately reaching beyond the conceptual frameworks that currently shape one's consciousness (Appendix F). The goal of understanding the effect of assumptions and frameworks on critical thinking is also re-emphasized within the disciplines. Humanities faculty expect students to encounter a multiplicity of cultural assumptions and see how these guide their perceptions (Riordan, 1986; Roth, 1986). But, only some of the humanities general education criteria for a Critical Self-Consciousness of the Thinking Process (see Appendix F) transfer directly to performance after college, and those criteria that do transfer after college do not require, at this point in time, demonstration of an understanding of how thinking is culturally conditioned. (One may expect requirements to change as graduates become more involved in global concerns.)

That criteria for college performance are related to but not always equivalent to post-college performance is demonstrated in Figure 7, "Some relations between developmental performance criteria for assessing critical thinking in humanities (general education) and criteria for assessing five-year alumnae." It seems that there are multiple disciplinary paths to the world of performance after college. For example, Alverno researchers who code alumna performance see *perceptual objectivity* (the demonstration of an understanding of more than one perspective) as an important aspect of managerial performance. Students can learn this broad ability through a humanities curriculum focusing on cultural assumptions; they can learn it through a psychology curriculum focusing on the multiple interpretations of behavior; or they can learn it through the consistent juxtaposition of different disciplinary frameworks in college. How students learn the ability in college will generally affect how faculty assess them for it, but how the ability is manifested after college can be assessed more generically if we focus on what is broadly transferred to post-college performance. By studying abilities of graduates after college, we can better identify what we expect to transfer from college to post-college performance.

## Figure 7. Some Relations Between Developmental Performance Criteria for Assessing Critical Thinking in Humanities (General Education) and Criteria for Assessing Five Year Alumnae

| ASSESSED IN COLLEGE: HUMANITIES DEVELOPMENTAL PERFORMANCE CRITERIA[1] | ABILITY COMPONENTS USED IN BOTH COLLEGE AND WORK | ASSESSED AFTER COLLEGE: PERFORMANCE CRITERIA SIMILAR TO HUMANITIES CRITERIA[2] |
|---|---|---|
| **Systematic Thinking** | **Systematic Thinking** | **Similar To Systematic Thinking** |
| 1. Strives to notice as much as possible in the object of her thought (e.g., a statement, a book, a work of art, behavior). | 1. Strives to notice as much as possible in the object of her thought (e.g., a statement, behavior). | 4. Conceptualization: Identifies the most important issue(s) in a complex situation. |
| 2. Recognizes that there are appropriate sets of concepts (specialized vocabulary) for describing different kinds of phenomena and generally uses that language appropriately in communicating her observations. | 2. Recognizes that there are appropriate sets of concepts (specialized vocabulary) for describing different kinds of phenomena and generally uses that language appropriately in communicating her observations. | 4. Diagnostic Information Seeking: Uses questions to identify the specifics of a problem or other situation. |
| 3. Distinguishes between what she observes and what she says about the object of that observation. | 3. Distinguishes between what she observes and what she says about the object of that observation. | 4. Diagnostic Pattern Recognition: Identifies the discrepancies between the specifics of a particular case and the more general pattern. |
| 4. Independently identifies and uses conceptual frameworks to organize and synthesize her understanding of that which she has observed and to communicate that understanding to others. | 4. Independently identifies and uses conceptual frameworks to organize and synthesize her understanding of that which she has observed and to communicate that understanding to others. | 4. Diagnostic Pattern Recognition: Distinguishes relevant from irrelevant information. |
| **Critical Self-Consciousness of the Thinking Process** | **Critical Self-Consciousness of the Thinking Process** | **Similar To Critical Self-Consciousness of the Thinking Process** |
| 4. Evaluates the perceptions, judgments, and behavior of others relative to their context (i.e., withholds absolute judgment). | 4. Evaluates the perceptions, judgments, and behavior of others relative to their context (i.e., withholds absolute judgment). | 4 Perceptual Objectivity: Tolerating Diverse Opinions: accepts or actively considers differing opinions of others without premature foreclosure. |
| 5. Recognizes that experience may have multiple layers of meaning; sees beyond the literal meaning; shows tolerance for ambiguity, uncertainty, "loose ends." | 5. Recognizes that experience may have multiple layers of meaning; sees beyond literal meaning; shows tolerance for ambiguity, uncertainty, "loose ends." | 4. Positive Regard: Expresses respect for others who are perceived as different. |
| 6. Is willing to question the assumptions and validity of her own perceptions and knowledge and those of others. | 6. Is willing to question the assumptions and validity of her own perceptions and knowledge and those of others. | 4. Developing Others: Invites subordinates/colleagues to discuss problems affecting performance |
| 7. Seeks authority (the knowledge and experience of others) as a guide to understanding and action, but ultimately takes personal responsibility for all of her judgments. | 7. Seeks authority (the knowledge and experience of others) as a guide to understanding and action, but ultimately takes personal responsibility for all of her judgments. | 6. Accurate Self-Assessment (Commitment to Improve): Admits a weakness, mistake, or lack of knowledge, while recognizing the importance of overcoming the process that led to it |
| | | 6. Reflective Thinking/Valuing: Identifies and reflects on behavior, feelings, or beliefs and their consequences. It may include reflecting on a weakness or mistake. This must result in showing or searching for new insight about self. |
| | | 7. Proactivity: Takes responsibility for own judgment and acts independently within a social frame. |
| | | 7. Ego Strength: Fulfills responsibility at risk of incurring disapproval of others. |
| | | 7. Reflective Thinking/Valuing: Relates decisions or actions to own values. |
| **Reaching Beyond the Conceptual Frameworks Which Currently Shape One's Consciousness** | **Reaching Beyond the Conceptual Frameworks Which Currently Shape One's Consciousness** | **Similar To Reaching Beyond the Conceptual Frameworks Which Currently Shape One's Consciousness** |
| 1. Actively explores complexity instead of ignoring or stepping around it. | 1 Actively explores complexity instead of ignoring or stepping around it. | 1. Diagnostic Information Seeking: Seeks information from multiple sources to clarify a situation. |
| 3. Actively seeks a critical understanding of alternate points of view and ways of knowing. | 3 Actively seeks a critical understanding of alternate points of view | 1. Diagnostic Information Seeking: Seeks and gets information that clarifies a situation. |
| 4 Has the capacity to mediate between different points of view and to integrate diverse views | 4. Has the capacity to mediate between different points of view and to integrate diverse views. | 4. Perceptual Objectivity: communicates to interviewer that she has an understanding of the different perspectives that each party brings to a conflict or interpersonal event. |
| 5. Makes personal judgments only after examining multiple contexts and multiple perspectives, and, even then, recognizes the limits of her judgment. | | 5. Use of Socialized/Political Power: Uses awareness of own role and role of others in group in shaping the task and deciding about the process |

[1] Adapted from Roth, R., & Riordan, T. (1984). Behaviors characteristic of the critical thinker. Milwaukee, WI: Alverno Productions.

[2] Adapted from Rogers, G., & Talbott, M. (1991). Generic ability codes for scoring the Behavioral Event Interview of Alverno Alumnae. Milwaukee, WI: Alverno Productions

The depth of learning in the disciplines is an important framework for learning to think that must be preserved in our formulation of what is transferred to post-college performance. Generic criteria do not directly address this depth of disciplinary learning. After the undergraduate experience, however, we can look for conceptualization that does have depth. In making comparisons of depth of thinking after college to thinking in college, it is important to recognize that thinking after college may be more difficult to do. Disciplinary study is a sustained and collective inquiry that colleges and universities have a special responsibility for promoting, but after college graduates will not have the systematic thinking of others laid out as an ongoing forum of inquiry into a specific topic that they are invited to join. Admittedly, depth of thinking is still a hallmark of good graduates' performance, as Figure 5 demonstrates. Here, in keeping with our focus on critical thinking for this example, we have listed levels of criteria for conceptualization in Figure 5, in order to reinforce the depth of thinking that characterizes post-college performance. This is an ability we code for in graduates' performance across both work and service roles.

For Alverno alumnae, conceptualization has been demonstrated outside of disciplinary-based inquiry. In our alumnae generic ability codebook, the various manifestations of conceptualization are described as *identifying and seeing key relationships between key issues, while understanding the big picture.* For our five-year alumnae, *seeing key relationships* is a contribution to work performance.

### Effective Alumnae Demonstrate Complex, Integrated Performance

The kind of performance that integrates many situational aspects and levels of contexts can be contrasted with other performances that tend to be more limited or short term. In the Behavioral Event Interview, some of the most frequent abilities demonstrated in context involved very short bursts of ad hoc performance. For example, alumnae often initiated new actions, communications, proposals, or meetings to accomplish a task and often listed some alternatives or consequences (showing hypothetical if-then thinking). Although many alumnae contributed through these short bursts of performances, this kind of performance generally did not make a profound difference in the situation nor was it judged as particularly effective by faculty, even though it is contextually appropriate. While complex, integrated performances were less frequent (for example, making a conceptual contribution that integrates diverse issues or that connects individual initiatives to the collective organizational goals), these complex and integrated performances stand out as making substantial contributions. They are the kinds of performances that colleges can probably take most of the credit for achieving.

Given the evidence, we recommend the following:

> Recommendation #6. A national assessment system should sample graduates' performance at work and in citizenship roles, as well as in college, and judge performance in relation to those developmental criteria that distinguish effective performance.

## IMPLICATIONS, ISSUES, AND QUESTIONS

There are two implications to draw here. While we have discussed performance interviews, we do not set this measure out as the only alternative. Rather, we have set forth a technique that we have confidence in and that is beginning to meet our goals both for improving curricula (defining abilities and building performance criteria) and for accountability (distinguishing effective performance). Other measures need to be developed.

Institutions, employers, and alumnae need to work together to design and develop appropriate strategies for sampling performance through work samples, portfolios, behavioral event interviews, critical incident

techniques, or other assessment technologies already in place at work. Further, those involved in this effort will need to work further to identify abilities involved in "effective" work and citizenship roles. We have provided some evidence that this information can be collected directly from college graduates at work and in service. Still, a number of issues remain.

• How assess for integrated performance?

This issues asserts itself again. While a codebook effectively enables us to identify abilities and their components, we will need to demonstrate reliable coding in order to ensure that we identify which abilities are integrated and see how they are combined in performance. Further, we know from perspectives interview data, that some alumna constructions that illuminate value orientations toward learning and self-sustained learning do not necessarily appear full-blown in performance interviews. There is a good deal of work to be done to define what we mean by integrated performance and how to recognize it when it occurs.

• How assess performance-in-context?

This question has not been dealt with fully, and our earlier discussions elaborate on the difficulties of the issue. Clearly, the degree to which abilities should be defined broadly or specifically will continue to challenge us, particularly since performance criteria used to demonstrate effectiveness of employees in the work place usually demand that performance be related to effectiveness in a particular position. This raises still another question.

• How account for differences in work settings and in professional roles?

Clearly, it is difficult to account for differences in work settings and in professional roles. When assessment technologies are used in the workplace to identify abilities for training and selection, designers can generally rely on job descriptions or other role definitions that a particular organization has developed. Indeed, one of the reasons the Job Competence Assessment Process was developed was because organizations generally did not know what abilities distinguished various roles.

When moving to using the method in post-college follow-up studies, one is faced with developing ability definitions and developmental performance criteria that cross professional roles and contexts. We have dealt with this issue by coding for type of dynamic setting (e.g., system level failure, values conflict, development of others, interpersonal conflict), and by coding performance in relation to the outcome ("What happened as a result"), within an extensive description of situational elements ("Who was involved? What led up to it?").

In our research, we continue to confront the issue of how variability in setting and roles affects our judgments. For example, we asked faculty representing a range of interdisciplinary general education areas to judge the relative effectiveness of examples of performance from across a wide range of settings (graduate learning, child rearing, volunteering). We asked professional faculty to judge the relative effectiveness of examples of performances from within their profession, but their judgments still had to span different roles and settings within the profession. To evaluate how effectively we are dealing with this issue we will still have to pursue this in greater depth.

• How use expert judgment to code abilities in performance?

We have developed a number of strategies to code abilities in performance, but we will not elaborate them here (Mentkowski, et al, 1982; Rogers & Talbott, in press). These strategies address selecting of assessors, describing the judgment process, analyzing use of criteria in relation to student responses, establishing inter-judge agreement, evaluating assessor training, analyzing assessor judgment and feedback, and analyzing performance in relation to criterion measures.

The effort to generate valid expert judgment and to describe and design processes for ensuring validity means investment. So far, Alverno has been investing in the development of strategies for using expert judgment to code abilities in performance in the curriculum for 18 years, and in the Office of Research and Evaluation for 15 years. We suggest that this investment is comparable to the value of the results. Faculty and external audience response to the data so far has outweighed the costs, or we would not continue to do use this technology.

• How validate expert judgment of complex, integrated performance?

One might argue that for deciding what modes of response are good evidence and determining the validity of the expert judge's interpretation of the response, we are relying on similar measurement principles that we have used earlier. Therefore, all we are changing, basically, is that we are using qualitative rather than quantitative methods and procedures. In fact, exploring qualitative methods, and applying the same validity criteria we have always applied is only a first step.

Generally speaking, when we establish the validity of expert judgment, we ask for inter-judge agreement. We look to see if the judgment of one assessor is similar to that of another. And we have various statistical procedures to determine agreement or reliability. However, in situations where we are assessing complex abilities and integrated performance in complex situations, we might argue that we have to be careful that agreement between the judges does not get too high. Here is where quantitative measurement assumption breaks down. Generally, the higher the level of agreement, the better. But if we are asking two judges, one from Humanities and one from Behavioral Sciences, to judge performance of a student's performance, we know that we cannot specify the criteria for judgment entirely, that each judge will call forth the perspective of their discipline to make a global judgment.

If the level of assessor agreement is too high, we might be asking for simplistic judgment of complex, integrated performance. Suppose a hospital nurse supervisor, a nursing faculty member, and the hospital's ethicist are making judgments on the ethical decision-making ability of a nurse as she resolves a complex ethical dilemma. Such a dilemma may involve, for example, a patient who is asking about whether he is dying, and she must decide whether to informatively respond that he is indeed dying, which would be against the wishes of the family and the doctor. The nurse supervisor, the nursing faculty member, and the ethicist may bring quite different philosophical perspectives to bear. Indeed, we would wish that to be the case. The alumna should be prepared to perhaps deal with the weight given to a more idealistic perspective by a nursing instructor whose responsibility is to develop independent, complex decision-making in nursing students so that the profession advances. The hospital nurse, on the other hand, may be weighing much more the practical judgment that considers the role of a nurse in a hospital and the limitations of her role. In such cases, inter-judge agreement, if it gets too high, may be cause for concern. Currently, our measurement theory does not account for such a situation. In short, reliability becomes a secondary consideration, and the methods that define reliability are limited in this application.

We have a number of well-established strategies for validating expert judgment, which we describe in numerous Alverno publications (e.g., Alverno College Office of Research and Evaluation/Assessment Committee, in press). We still have to sort through a number of issues related to establishing the validity of judgment when complex, integrated performance is elicited, and when assessors are deliberately drawn from different perspectives and roles.

• How judge effectiveness?

Judging effectiveness is a complex task. Many of the common strategies open to us to get confirmation from external sources (employers, experts in the profession) present difficulties. In studies that cross such a wide range of situations and roles as alumna studies do, finding a common measurement is clearly difficult. Nor do

some of the standard indicators such as level of position and salary serve these purposes. Our study of women managers found that position was not related to performance. Salary was often not a good indicator when geographical pay scales and private and public sector finances were not in balance. Further, we found that level of position or job title has its own difficulties, particularly for women in those professions that have traditionally had few if any "upward" career paths open to them. This argues that judgments of effectiveness are perhaps best made by expert judges who judge behavior in context through interviews. This has its own difficulties; however, it seems to pay off in generating abilities that do discriminate effective alumna performance.

- How make assessment cost effective? What legal issues are involved in performance samples of employees for post-college studies?

Clearly, costs for such an effort have still to be determined. Nor can we overlook the legal issues that are likely to arise in collaborative studies where colleges study their alumnae at work, particularly if alumnae contribute work samples or information from performance appraisals.

In some of our earlier work, we were advised by our colleagues in the business community that judgments we might ask of employers about alumna performance were subject to the regulations for performance appraisal information, and that any judgments employers made—even for purposes other than performance appraisal—had similar bounds. The oft-suggested comment that employer ratings can be used as criterion information for alumna effectiveness, runs up against that concern, along with concern for comparability of ratings across judges.

In sum, we believe that there is enough evidence to suggest that performance interviews can yield the kind of information that will enable complex, integrated performance to be assessed at work and in citizenship roles. A good deal of effort will need to accompany such an assessment on a wider scale.

Principle Learned #7. Faculty, professionals, and employers will invest in understanding the relationship between education and work if they can create contextually rich descriptions of performance in relation to their judgment of what abilities to develop.

We expect that the evidence that has accumulated in this paper will demonstrate that faculty, professionals, and employers will invest in a national assessment system because they will come face to face with descriptions of performance that illuminate their educational mission and help develop assessment techniques. Therefore, we recommend the following:

Recommendation #7. Faculty, employers, and public representatives should be involved in making judgments about the abilities essential to effective post-college performance at work and in citizenship roles.

## IMPLICATIONS, ISSUES, AND QUESTIONS

Here we repeat an implication that has had major play in Alverno's perspective on institutional assessment: that assessment means creating a context where everyone's investment leads to educational improvement, and that the processes that involve the key players are as important as the method itself (Loacker, 1991; Mentkowski, 1991).

Since we have developed that idea elsewhere, we will close with an issue that we believe underlies much of what we have said here.

• How assess for what employers and the public really want to see:
personal maturity, leadership, ethical decision-making, and integrated performance?

The abilities we have described and defined in this paper should lead the reader to understand that much of what faculty and students, employers and employees believe is important, is difficult to codify and measure. While, in all our research, we saw elements of personal maturity, leadership, ethical decision-making, and integrated performance, it is clear that these broad outcomes are not tapped in full. To what degree will an assessment system yield the kind of information that will enable all of us to draw the conclusion that we are closer to seeing these outcomes in college graduates?

The arguments presented in this paper depend on substantial investment on the part of everyone involved. However, the kind of national assessment system we propose also *creates* increased investment. We need to assume that those responsible for the design to implement the national goals are willing to accept available data on abilities/outcomes that link education and work, and to pursue the implications of that data. If so, they should be able to begin building a national assessment system that would ultimately contribute to the improvement of both higher education and life after graduation for the American citizen at work and in other roles in society.

## REFERENCES

Adams, R. D. (1987). Follow-up studies of teacher education graduates. In M. Haberman & J. M. Backus (Eds.), Advances in teacher education (Vol. 3, pp. 181-201). Norwood, N.J.: Ablex.

Alverno College Faculty. (1979, revised 1985). Assessment at Alverno College. Milwaukee, WI: Alverno Productions.

Alverno College Faculty. (1985). Liberal learning at Alverno College (rev. ed.). Milwaukee, WI: Alverno Productions.

Alverno College Faculty. (1991). bility-based learning program (rev. ed.). Milwaukee, WI: Alverno Productions.

Alverno College Assessment Committee/Office of Research and Evaluation. (1980). Validating assessment techniques in an outcome-centered liberal arts curriculum: Insights from the evaluation and revision process. (ERIC Document Reproduction Service No. ED 239 559)

Alverno College Office of Research and Evaluation/Assessment Committee. (in press). Putting the validation process to work: A series of strategies for establishing the validity of faculty-designed performance assessment instruments. Milwaukee, WI: Alverno Productions.

Argyris, C., & Schon, D. (1974). Theory in practice: Increasing professional effectiveness. San Francisco: Jossey-Bass.

Association of American Colleges. (1991). Liberal learning and the arts and sciences major: Reports from the fields. Washington, DC: Author.

Astin, A. W. (1991). Assessment for excellence: The philosophy and practice of assessment and evaluation in higher education. New York: Macmillan.

Astin, A. W., Inouye, C. J., & Korn, W. S. (1986, August). Evaluation of the CAEL Student Potential Program. Columbia, MD: CAEL (Council for Adult and Experiential Learning).

Ayers, J. B. (1986). Teacher education program evaluation: A case-study past and future. (ERIC Document Reproduction Service No. ED 275 669)

Boyatzis, R. (1982). The competent manager. New York: John Wiley & Sons.

Bradshaw, David. (in press). Classifications and models of transferable skills. In H. Eggins, The humanities and employment. Basingstoke, United Kingdom: Falmer Press.

Burke, J. W. (Ed.). (1989). Competency-based education and training. East Sussex, United Kingdom: Falmer.

Collins, L. M., & Horn, J. L. (in press). Best methods for the analysis of change? Washington, DC: American Psychological Association Press.

Council for Adult and Experiential Learning. (1986). Student Potential Program. Chicago: Author.

DeBack, V., & Mentkowski, M. (1986). Does the baccalaureate make a difference: Differentiating nurse performance by education and experience. Journal of Nursing Education, 25(7), 275-285.

Deemer, D. (in press). Illustrations of student voices: Studying the outcomes of college from the perspectives of students. Milwaukee, WI: Alverno Productions.

Deemer, D., & Mentkowski, M. (in progress). Mapping a learning process: Observations from Alumnae Perspectives Interviews. Milwaukee, WI: Alverno Productions.

Deemer, D., & Mentkowski, M. (1990). Studying the outcomes of college from the perspective of the student: A rationale and method for the student/alumna Perspectives Interview approach. Milwaukee, WI: Alverno Productions.

DeWitt, K. (1991, August). In Vermont schools, test on how well students think draws new interest. New York Times, Education Life.

Diez, M. (1990). A thrust from within: Reconceptualizing teacher education at Alverno College. Peabody Journal of Education, 65(2), 4-18.

Dinham, S. M., & Evans, L. M. (1991). Assessment and accreditation in professional schools. The Review of Higher Education. 14(2), 217-237.

Doherty, A., Mentkowski, M., & Conrad, K. (1978). Toward a theory of undergraduate experiential learning. New Directions of Experiential Learning (Vol. 1). San Francisco: Jossey-Bass.

Erwin, D. T. (1991). Assessing student learning and development. San Francisco: Jossey-Bass.

Evarts, H. (1982, January). The competency program of the American Management Associations. New York: Institute for Management Competency, American Management Associations.

Finch, C. R., Gregson, J. A., Faulkner, S. L. (1991). Leadership behaviors of successful vocational education administrators. Berkeley, CA: National Center for Research in Vocational Education.

Finkel, A., & Norman, G. R. (1973). The validity of direct-observation in assessment of clinical skills. (ERIC Document Reproduction Service No. ED 091 445 TM003663)

Fivars, G., & Gosnell, D. (1966). Nursing evaluation: The problem and the process. New York: The Macmillan Company.

Flanagan, J. C. (1954). The critical incident technique. Psychological Bulletin, 51(4), 327-358.

Forrest, A., & A study group on portfolio assessment. (1990). Time will tell: Portfolio-assisted assessment of general education. Washington, DC: American Association for Higher Education.

Frederiksen, N. (1986). Toward a broader conception of human intelligence. American Psychologist, 41(4), 445-452.

Friedman, M., Mentkowski, M., Deutsch, B., Shovar, M., & Allen, Z. (1982). Validating assessment techniques in an outcome-centered liberal arts curriculum: Social Interaction Generic Instrument. Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service No. ED 239 558)

Friedman, M., Mentkowski, M., Earley, M., Loacker, G., & Diez, M. (1980, April). Validating assessment techniques in an outcome-centered liberal arts curriculum: Valuing and Communications Generic Instruments. Paper presented at the annual meeting of the American Educational Research Association, Boston. Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service No. ED 239 557)

Galluzo, G. R., & Craig, J. R. (1990). Evaluation of preservice teacher education programs. In W. R. Houston (Ed.), Handbook of research on teacher education (pp. 599-616). New York: Macmillan.

Gardner, H. (1983). Frames of mind: The theory of multiple intelligence. New York: Basic Books.

Giencke-Holl, L., Mentkowski, M., Much, N., Mertens, S., & Rogers, G. (1985, April). Evaluating college outcomes through alumnae studies: Measuring post-college learning and abilities. Paper presented at the annual meeting of the American Educational Research Association, Chicago.

Gonnella, J. S., & Hozat, M. (1983). The relationship between performance in medical school and post-graduate competence. Journal of Medical Education, 58, 679-695.

Gunzburger, L. K., Frazier, R. G., Yang, L-M, Rainey, M. L., & Wronski, T. (1987). Premedical and medical school performance in predicting first-year residency performance. Journal of Medical Education, 62(5), 379-384.

Hubbard, J. P., Levit, E. J., Schumacher, C. F., & Schnabel, T. G. (1965). An objective evaluation of clinical competence: New technics used by the National Board of Medical Examiners. The New England Journal of Medicine, 272(25), 1321-1328.

Jessup, G. (1991). Outcomes: NVQs and the emerging model of education and training. London: Falmer.

Klemp, G., Jr. (1977, March). Three factors of success in the world of work: Implications for curriculum in higher education. Paper prepared for the 32nd National Conference on Higher Education, Boston.

Klemp, G., Jr. (1978). Job competence assessment. Boston: McBer and Company.

Klemp, G. O., Jr. (1982). Job competence assessment: Defining the attributes of the top performer. American Society for Training and Development Research Series, 8, 55-67.

Klemp, G. O., Jr. (1988). The meaning of success: A view from outside the academy. Liberal Education, 74(3), 32-41.

Klemp, G. O., Jr. (1991). Cognitive strategies and practical intelligence. Paper presented at the 77th annual meeting of the Association of American Colleges, Boston.

Klemp, G. O., Jr., & McClelland, D. C. (1986). What characterizes intelligent functioning among senior managers? In R. J. Sternberg & R. K. Wagner (Eds.), Practical intelligence: Nature and origins of competence in the everyday world. (pp. 31-50). Cambridge: Cambridge University Press.

Klemp, G., & Sokol, M. (1980). Competency model of the army organization effectiveness staff officer. Draft submitted to the U.S. Army Research Institute for the Behavioral and Social Sciences. Boston: McBer and Company.

Kolb, D. (1976). The Learning Style Inventory. Boston: McBer and Company.

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Englewood Cliffs, NJ: Prentice-Hall.

Loacker, G. (1991). Designing a national assessment system: Alverno's institutional perspective. Paper commissioned by the U.S. Office of Education, National Center for Education Statistics, in response to the National Education Goals Panel: America 2000: An Education Strategy. Milwaukee, WI: Alverno Productions.

Lofland, J. (1971). Analyzing social settings: A guide to qualitative observation and analysis. Belmont, CA: Wadsworth.

McClelland, D. (1975). Power: The inner experience. New York: Irvington.

McClelland, D. (1976). A guide to job competency assessment. Boston: McBer and Company.

McClelland, D. C. (1978). Behavioral event interview. Boston: McBer and Company.

McClelland, D. C., Spencer, L. M., & Spencer, S. M. (1990, August). History and state-of-the-art of "job competency assessment" methods. Paper presented at the annual conference of the American Psychological Association, Boston.

Mentkowski, M. (1988). Paths to integrity: Educating for personal growth and professional performance. In S. Srivastva & Associates, (Eds.), Executive integrity: The search for high human values in organizational life (pp. 89-121). San Francisco: Jossey-Bass.

Mentkowski, M. (1989). Establishing the validity and integrity of higher education assessment: Some issues for discussion. Presented at the Fourth National Conference Assessment in Higher Education, Atlanta. In M. Bunda (Chair), Perspectives on assessment. Symposium conducted at the Meeting of the American Evaluation Association, San Francisco. Milwaukee, WI: Alverno Productions.

Mentkowski, M. (1990). Higher education assessment: Connecting to i ts conceptual base (Cassette Recording No. APA-90-164). In K. A. Weaver (Chair), Facing the challenge of student, program, and institutional assessment. Symposium conducted at the Meeting of the American Psychological Association, Boston. Washington, DC: American Psychological Association.

Mentkowski, M. (1991). Creating a context where institutional assessment yields educational improvement. Journal of General Education, 40, 255-283.

Mentkowski, M., & Doherty, A. (1983). Careering after college: Establishing the validity of abilities learned in college for later careering and professional performance (Final Report to the National Institute of Education). Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service Nos. ED 239536 to ED 239 566)

Mentkowski, M., & Doherty, A. (1983, revised 1984). Careering after college: Establishing the validity of abilities learned in college for later careering and professional performance (Final report to the National Institute of Education: Overview and Summary) (rev. ed.). Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service No. ED 239 556)

Mentkowski, M., & Doherty, A. (1984). Abilities that last a lifetime: Outcomes of the Alverno experience. AAHE Bulletin, 36(6), 5-6 and 11-14.

Mentkowski, M., & Much, N. (1985). Alverno College Alumna Perspectives Interview (rev. ed.). Milwaukee, WI: Alverno Productions.

Mentkowski, M., Much, N., & Giencke-Holl, L. (1983). Careering after college (Fifth Report to Participants in a Longitudinal Study of College Outcomes). Milwaukee, WI: Alverno Productions.

Mentkowski, M., O'Brien, K., Cleve, L., & Wutzdorff, A. (1983). Assessing experiential learning: The learning incident as an assessment technique. Milwaukee, WI: Alverno Productions.

Mentkowski, M., O'Brien, K., McEachern, W., & Fowler, D. (1982). Developing a professional competence model for management education (Final Report to the National Institute of Education: Research Report No. 10). Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service No. ED 239 566)

Mentkowski, M., Rogers, G., Deemer, D., Ben-Ur, T., Reisetter, J., Rickards, W., & Talbott, M. (1991, April). Understanding abilities, learning and development through college outcomes studies: What can we expect from higher education assessment? Symposium presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Mentkowski, M., & Strait, M. (1983). A longitudinal study of student change in cognitive development, learning styles, and generic abilities in an outcome-centered liberal arts curriculum (Final Report to the National Institute of Education: Research Report No. 6). Milwaukee, WI: Alverno Productions. (ERIC Document Reproduction Service No. ED 239 562)

Messick, S. (1980). Test validity and the ethics of assessment. American Psychologist, 35, 1012-1027.

Messick, S. (1982). Abilities and knowledge in educational achievement testing: The assessment of dynamic cognitive structures. Princeton, NJ.: Educational Testing Service.

Miles, M. B., & Huberman, A. M. (1984). Qualitative data analysis. Beverly Hills, CA: Sage Publications.

Much, N., & Mentkowski, M. (1982). Student perspectives on liberal learning at Alverno College: Justifying learning as relevant to performance in personal and professional roles. (ERIC Document Reporduction Srvice NO. ED 239 563)

Much, N., & Mentkowski, M. (1984). Student perspectives on learning and development in college. Milwaukee, WI: Alverno Productions.

Norman, G. R., Tugwell, P., & Feightner, J. W. (1982). A comparison of resident performance on real and simulated patients. Journal of Medical Education, 57(9), 708-715.

Norman, G. R., Neufeld, V. R., Walsh, A., Woodward, C. A., & McConbey, G. A. (1985). Measuring physicians' performance by using simulated patients. Journal of Medical Education, 60(12), 925-934.

Pascarella, E. T., & Terenzini, P. T. (1991). How college affects students: Findings and insights from twenty years of research. San Francisco: Jossey-Bass.

Renner, J., Fuller, R., Lochhead, J., John, J., Tomlinson-Keasey, C., & Campbell, T. (1976). Test of Cognitive Development. Norman, OK: University of Oklahoma.

Riordan, T. (1986). Obstacles to the development of critical thinking and ways to overcome them. In L. S. Cromwell, (Ed.), Teaching critical thinking in the arts and humanities (pp. 19-27). Milwaukee, WI: Alverno Productions.

Rogers, G., & Reisetter, J. (1989). Flexible strategies for behavioral event interviewing: Exploring events and situations. Milwaukee, WI: Alverno Productions.

Rogers, G., & Talbott, M. (1990). Behavioral Event Interview write-up manual: Preparing the participant's description of the event for scoring and reading. Unpublished manuscript, Alverno College, Milwaukee, WI.

Rogers, G., & Talbott, M. (1991). Generic ability codes for the Behavioral Event Interview of Alverno alumnae. Milwaukee, WI: Alverno Productions.

Rogers, G., & Talbott, M. (in press). Alverno faculty validation of scoring of alumnae generic abilities through the Behavioral Event Interview. Milwaukee, WI: Alverno Productions.

Rogers, G., & Talbott, M. (in progress). Generic ability scoring manual for Behavioral Event Interview of Alverno alumnae. Milwaukee, WI: Alverno Productions.

Roth, J. (1986). Interdisciplinary humanities: Sharing responsibility for students' development as critical thinkers. In L. S. Cromwell, (Ed.), Teaching critical thinking in the arts and humanities (pp. 37-50). Milwaukee, WI: Alverno Productions.

Roth, R., & Riordan, T. (1984). Behaviors characteristic of the critical thinker. Milwaukee, WI: Alverno Productions.

Schall, C., Guinn, K., Qualich, R., Kramp, M. K., Schmitz, J., & Stewart, K. (1984). Competence and careers: A study relating competences acquired in college to career options for the liberal arts graduate. Milwaukee, WI: Alverno Productions.

Spencer, L. M., & Spencer, S. M. (1986). Revised generic competency dictionary. Unpublished manuscript.

Stark, J. S., & Lowther, M. A. (1988). Strengthening the ties that bind: Integrating undergraduate liberal and professional study. Ann Arbor, MI: The Regents of the University of Michigan.

Sternberg, R. J. (1986). Beyond IQ: A triarchic theory of human intelligence. New York: Cambridge University Press.

Terenzini, P. T. (1989). Assessment with open eyes: Pitfalls in studying student outcomes. Journal of Higher Education, 60(6), 644-664.

U. S. Department of Labor, The Secretary's Commission on Achieving Necessary Skills. (1991, June). What work requires of schools: A SCANS report for America 2000. Washington, DC: Author.

Veloski, J. J., Herman, M. W., Gonnella, J. S., Zeleznik, C., & Kello, W. F. (1979). Relationships between performance in medical school and first post-graduate year. Journal of Medical Education, 54(11), 909-916.

Watson, G., & Glaser, E. (1964). Critical thinking appraisal. New York: Harcourt, Brace, & Jovanovich.

Willett, J. B. (1988). Questions and answers in the measurement of change. In Ernst Rothkopf (Ed.), Review of Research in Education, 15, 345-422.

Willett, J. B. (1989). Some results on reliability for the longitudinal measurement of change: Implications for the design of studies of individual growth. Educational and Psychological Measurement, 49(3), 587-602.

Wilson-Pessano, S. R. (1988, April). Defining professional competence: The critical incident technique 40 years later. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Wolf, A. (1989). Can competence and knowledge mix? In J. W. Burke (Ed.), Competency-based education and training. East Sussex, United Kingdom: Falmer.

Woodward, C. A. (1984). Assessing the relationship between medical education and subsequent performance. Assessment and Evaluation in Higher Education, 9(1), 19-29.

Woodward, C. A., & Ferrier, B. M. (1982). Perspectives of graduates two and five years after graduation from a three-year medical school. Journal of Medical Education, 57(4), 294-301.

Yindra, K. J., Rosenfeld, P. S., & Donnelly, M. B. (1988). Medical school achievements as predictors of residency performance. Journal of Medical Education, 63(5), 356-363.

**APPENDIX A:**

ALVERNO COLLEGE
Milwaukee, Wisconsin

ABILITY-BASED LEARNING PROGRAM

**Abilities that**
- **involve the whole person**
- **are teachable**
- **can be assessed**
- **transfer across settings**
- **are continually re-evaluated and re-defined**

The curriculum is an ability-based, outcome-oriented approach to liberal arts/professional education. To earn a degree at Alverno College a student demonstrates the eight broad abilities listed below, at increasingly complex levels, in general education and in her areas of specialty.

These abilities constitute liberal education at the college and undergird and infuse advanced study in the disciplines and professions. Within the curriculum of a given major, the student develops the abilities according to the distinctive requirements of the disciplines and professions.

Throughout her course of studies, the student participates in performance-based assessments and learns to assess herself. Her progression toward a degree is based upon these assessments, both internal and external.

With demonstrated achievement at each level the student receives one level unit. For a Bachelor's degree, in addition to 32 units awarded when she has demonstrated the first four levels of each of the eight abilities, the student must achieve another 8 units, at least one of them at level 6. Advanced levels of any given ability require more time and effort to achieve than lower ones. For an Associate of Arts degree in General Studies, a student demonstrates her ability at the first four levels in each of the eight areas.

**Abilities and Developmental Levels**

1 **Develop communication ability (effectively send and respond to communications for varied audiences and purposes)**

Level 1 — Identify own strengths and weaknesses as communicator
Level 2 — Show analytic approach to effective communicating
Level 3 — Communicate effectively
Level 4 — Communicate effectively making relationship: out of explicit frameworks from at least three major areas of knowledge

In majors and areas of specialization:
Level 5 — Communicate effectively, with application of communications theory
Level 6 — Communicate with habitual effectiveness and application of theory, through coordinated use of different media that represent contemporary technological advancement in the communications field

IN WRITING, READING, SPEAKING, LISTENING, USING MEDIA, QUANTIFIED DATA, AND THE COMPUTER

2 **Develop analytical capabilities**

Level 1 — Show observational skills
Level 2 — Draw reasonable inferences from observations
Level 3 — Perceive and make relationships
Level 4 — Analyze structure and organization

In majors and areas of specialization:
Level 5 — Establish ability to employ frameworks from area of concentration or support area discipline in order to analyze
Level 6 — Master ability to employ independently the frameworks from area of concentration or support area discipline in order to analyze

3 **Develop workable problem-solving skill**

Level 1 — Articulate and evaluate own problem-solving process
Level 2 — Define problems or design strategies to solve problems using discipline-related frameworks
Level 3 — Select or design appropriate frameworks and strategies to solve problems
Level 4 — Implement a solution and evaluate the problem-solving process used

In majors and areas of specialization:
Level 5 — Design and implement a process for resolving a problem which requires collaboration with others
Level 6 — Demonstrate facility in solving problems in a variety of situations

## APPENDIX A (continued)

4 **Develop facility in making value judgments and independent decisions**

Level 1 — Identify own values

Level 2 — Infer and analyze values in artistic and humanistic works

Level 3 — Relate values to scientific and technological developments

Level 4 — Engage in valuing in decision-making in multiple contexts

In majors and areas of specialization:

Level 5 — Analyze and formulate the value foundation/framework of a specific area of knowledge, in its theory and practice

Level 6 — Apply own theory of value and the value foundation of an area of knowledge in a professional context

5 **Develop facility for social interaction**

Level 1 — Identify own interaction behaviors utilized in a group problem-solving situation

Level 2 — Analyze behavior of others within two theoretical frameworks

Level 3 — Evaluate behavior of self within two theoretical frameworks

Level 4 — Demonstrate effective social interaction behavior in a variety of situations and circumstances

In majors and areas of specialization:

Level 5 — Demonstrate effective interpersonal and intergroup behaviors in cross-cultural interactions

Level 6 — Facilitate effective interpersonal and intergroup relationships in one's professional situation

6 **Develop global perspectives**

Level 1 — Assess own knowledge and skills to think about and act on global concerns

Level 2 — Analyze global issues from multiple perspectives

Level 3 — Articulate understanding of interconnected local and global issues

Level 4 — Apply frameworks in formulating a response to global concerns and local issues

In majors and areas of specialization:

Level 5 — Generate theoretical and pragmatic approaches to global problems, within a disciplinary or professional context

Level 6 — Develop responsibility toward the global environment in others

7 **Develop effective citizenship**

Level 1 — Assess own knowledge and skills in thinking about and acting on local issues

Level 2 — Analyze community issues and develop strategies for informed response

Level 3 — Evaluate personal and organizational characteristics, skills and strategies that facilitate accomplishment of mutual goals

Level 4 — Apply her developing citizenship skills in a community setting

In majors and areas of specialization:

Level 5 — Show ability to plan for effective change in social or professional areas

Level 6 — Exercise leadership in addressing social or professional issues

8 **Develop aesthetic responsiveness: Involvement with the arts**

Level 1 — Express response to selected arts in terms of their formal elements and personal background

Level 2 — Distinguish among artistic forms in terms of their elements and personal response to selected art works

Level 3 — Relate artistic works to the contexts from which they emerge

Level 4 — Make and defend judgments about the quality of selected artistic expressions

In majors and areas of specialization:

Level 5 — Choose and discuss artistic works which reflect personal vision of what it means to be human

Level 6 — Demonstrate the impact of the arts on your own life to this point and project their role in personal future

**ALVERNO COLLEGE**
Milwaukee, WI
Office of Research and Evaluation

## Appendix B: Abilities/outcomes Applied to Five-year Alumnae Interview Data (Behavioral Event Interview and Perspectives Interview)

**Abilities (Appendix A)**
- Communication
- Analysis
- Problem Solving
- Valuing
- Social Interaction
- Global Perspectives
- Effective Citizenship
- Aesthetic Responsiveness

(Alverno College Faculty, 1976, revised 1985)

**Understanding of domains of knowledge:**
- Natural Sciences and Mathematics
- Behavioral and Social Sciences
- Arts and Humanities

**Six Performance Characteristics**
- Integration
- Independence
- Creativity
- Awareness
- Commitment
- Habituality

(Assessment Committee/Office of Research and Evaluation, 1983)

**Other Expected Abilities/Outcomes Common to all Student:**[10] Abilities that transcend those developed through study and experience in disciplinary, interdisciplinary and professional areas. Alverno does not assess these directly for awarding academic credit, but includes them as outcomes measured in its college outcomes studies.

Special abilities: In the process of developing the eight abilities mentioned above in the context of various areas of knowledge and according to the educational structure and process designed by the faculty, students develop the following:

- Learning how to learn: learning approaches, preferences, styles; relationship of theory to practice; experience-its nature, purpose and relationship to learning
- Self assessment: ability and willingness to engage in diagnostic evaluation of strengths and weaknesses based on personal, academic and professional standards of achievement
- Self assessment assists in "understanding oneself" in relation to work/civic duty, multicultural environment.
- Cooperation/collaboration in community activity—academic, civic, professional
- Understanding oneself in relationship to world of work/civic duty
- Understanding oneself in multicultural (environment) context

[10] "Perspectives on Education at Alverno College: An Integrated Liberal/Professional Educational Program," Curriculum Committee, 1985; Addendum, 1988; Addendum, 4/27/1990, Addendum, 10/1990.

**Appendix B (continued): Abilities/outcomes Applied to Five-year Alumnae Interview Data (Behavioral Event Interview and Perspectives Interview)**

**Other Expected Abilities/Outcomes Common to all Students**[11] but developed according to the special characteristics of each discipline/profession and reflecting the uniqueness—style, interests, abilities—of each student.

Integration and Synthesis: Major and support areas of study
Major and humanistic studies (values/ethics; aesthetic works)
Major and liberal education abilities

Note: Expectation is that students develop the ability to integrate two significant areas of study; the ability to integrate and synthesize is among the most important liberal arts abilities (integrate major and support areas; integrate abilities within the disciplines; integrate knowing and doing)

Development of interests for future pursuit: intellectual; social; artistic

Personal and professional integrity (integrate one's personal and professional life and value system)

Use of information systems (use of computer, bibliographic and information retrieval systems); develop sense of self as intelligent user of technology and as one who understands the impact of technology on personal, family, civic, work, national, global life

Develop sense of self as intelligent user of technology and as one who understands the impact of technology on personal, family, civic, work, national, global life

Understanding and experience of distinction between in-depth and general knowledge

Commitment to quality,excellence

**Professional Competences**

**Alverno Teaching Study Competences**

Conceptualization
Diagnosis
Coordination
Communication
Integrative Interaction
(Alverno College Education Department/Office of Research and Evaluation, 1979; Diez, 1990)

**Alverno Nursing Study Competences**

Conceptualizing
Emotional Stamina
Ego Strength
Positive Expectations
Independence
Reflective Thinking
Helping
Influencing
Coaching
(DeBack & Mentkowski, 1986; Mentkowski, DeBack, Allen & Blanton, 1980)

[11] "Perspectives on Education at Alverno College: An Integrated Liberal/Professional Educational Program," Curriculum Committee, 1985; Addendum, 1988; Addendum, 4/27/1990, Addendum, 10/1990.

**Appendix B (continued): Abilities/outcomes Applied to Five-year Alumnae Interview Data (Behavioral Event Interview and Perspectives Interview)**

**McBer Management Competences**
- Socio-Emotional Maturity
  - Self-Control
  - Spontaneity
  - Perceptual Objectivity
  - Accurate Self-Assessment
  - Stamina and Adaptability
- Entrepreneurial Abilities
  - Efficiency Orientation
  - Proactivity
- Intellectual Abilities
  - Logical Thought
  - Conceptualization
    - Diagnostic Use of Concepts
- Interpersonal Abilities
  - Development of Others
  - Expressed Concern with Impact
  - Use of Unilateral Power
  - Use of Socialized Power
  - Concern with Affiliation
  - Positive Regard
  - Management of Groups
  - Self-Presentation
  - Oral Communication

(McBer and Co., 1978;Mentkowski, O'Brien, McEachern & Fowler, 1982; Schall, Guinn, Qualich, Kramp, Schmitz & Stewart, 1984)

**Klemp "Generic" Competences**
- Cognitive Abilities
  - Evaluative Thinking/Diagnostic Skill
  - Conceptualization
  - Systematic Thinking
- Interpersonal Abilities
  - Influence Skill
  - Sensitivity
  - Using the Informal Process
- Intrapersonal Factors
  - Confidence
  - Initiative
  - Persistence

(Klemp, 1988)

**McBer and Company "Generic" Competences**
- Achievement Orientation
- Initiative
- Concern for Order and Reduction of Uncertainty
- Use of Concepts
- Analytic Thinking
- Pattern Recognition
- Self Confidence
- Self Control
- Tenacity
- Technical Expertise
- Concern with Impact
- Interpersonal Sensitivity
- Persuasiveness
- Developing Others
- Directing Others
- Group Management
- Relationship Building

(Spencer & Spencer 1988)

Cross reference: MM-05/31/90 BEIOUTCOME/MARCIA/IBM38 (updated from 5/31/90) (updated from 11/22/88)

Appendix C: Summary of BEI Generic Abilities.

SOCIO-EMOTIONAL MATURITY

1. Self-Control/Emotional Stamina: Appropriately and effectively controls emotions so that they do not disrupt performance.

2. Ego Strength: Is assertive or perseveres in judgment while withstanding confrontation, disagreement or disapproval. Requires element of risk.

3. Stamina: Perseveres in a potentially or actually stressful situation.

4. Spontaneity/Curiosity: Playful thought, action or expression.

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5. Perceptual Objectivity: Demonstrates understanding of more than one perspective.

6. Accurate Self-Assessment: Accurately assesses strengths and weaknesses of own performance to improve or assess own abilities.

7. Reflective Thinking/Valuing: Identifies and reflects upon her own behavior, feelings or beliefs and their consequences. It may include reflecting upon a weakness or mistake, and must result in showing or searching for new insight about self or values.

ENTREPRENEURIAL ABILITIES

8. Proactivity: Taking action that is not scripted by the situation or her role and taking responsibility for the outcome/judgment (not "We").
   A. Initiative
   B. Risk taking initiative

9. Achievement Orientation: Desire to do something better than a standard of excellence.

10. Achievement Actions: Actions toward more efficient use of time and resources.

INTELLECTUAL ABILITIES

11. Specialized Knowledge: Use of knowledge that takes more than one year to acquire on the job.

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12. Diagnostic Information Seeking: Seeks information in an ambiguous situation.

13. Reflectively Coordinated Practice: Receptive to information value of ongoing events: coordinates ongoing actions, relates unusual observations or uses new information to adjust ongoing actions or plans.

14. Diagnostic recognition: Comparing a stimulus to an understanding or representation stored in memory.

15. Lists Alternatives: Sees a range of implications, consequences or alternatives, or sees if-then relationships.

16. Hypothetical/Causal Thinking: Shows systematic understanding of possibility and causality.

17. Planning/Systematic Thinking: Takes well-ordered and logical approaches to analyzing problems, organizing work and planning action.

18. Conceptualization: Identifying and seeing the key relationships between key issues while understanding the big picture.

**Appendix C (continued): Summary of BEI Generic Abilities.**

**INTERPERSONAL**

19. Formal Communication (demonstrated at time of performance): Effectively communicating in formal writing, speaking or planned interactive situation.

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20. Concern With Affiliation: Wanting to be with someone else in order to enjoy mutual friendship or company (warmth necessary): Exhibits concern over establishing, maintaining or restoring a warm relationship with another person. This relationship is most adequately described by the word friendship.

21. Affiliative Action: Enjoying, maintaining or establishing companionship for its own sake (warmth necessary).

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22. Positive Regard: Showing respect for others: seeing them as capable and worthy.

23. Sensitive to Individual Differences: Being aware of and responsive to individual differences.

24. Accurate Empathy: Effectively reads the moods and feelings of others.

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25. Development of Others: Use of a variety of strategies to insure others' development and to improve their performance.

26. Development of Self: Develops own knowledge, skills or capability.

27. Concern With Impact: Exhibits concern about establishing, maintaining or restoring impact, control or influence over other(s) (beyond routine and not avoiding power).

28. Use of Informational/Expert Influence: Uses own credentials for knowledge, access to specific information or construction of rationale to persuade others, including building support for ideas/objectives.

29. Developing Or Using Relational Power: Establishes a warm or inclusive relationship (or uses others' desire for one) in order to influence behavior of others.

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30. Use of Socialized/Political Power: Effectively working with others to accomplish tasks.
    A. Political Organizational Action
    B. Dyad/Small Group Action

31. Development of Organizational Power: Develops organizational power through strategic personal contact or shows understanding of how organization is functionally structured.
    A. Develops Organizational Power
    B. Understands Functional Structure

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32. Use of Unilateral Power: Gives directions/orders based upon personal authority or rules/procedures to obtain compliant behavior.

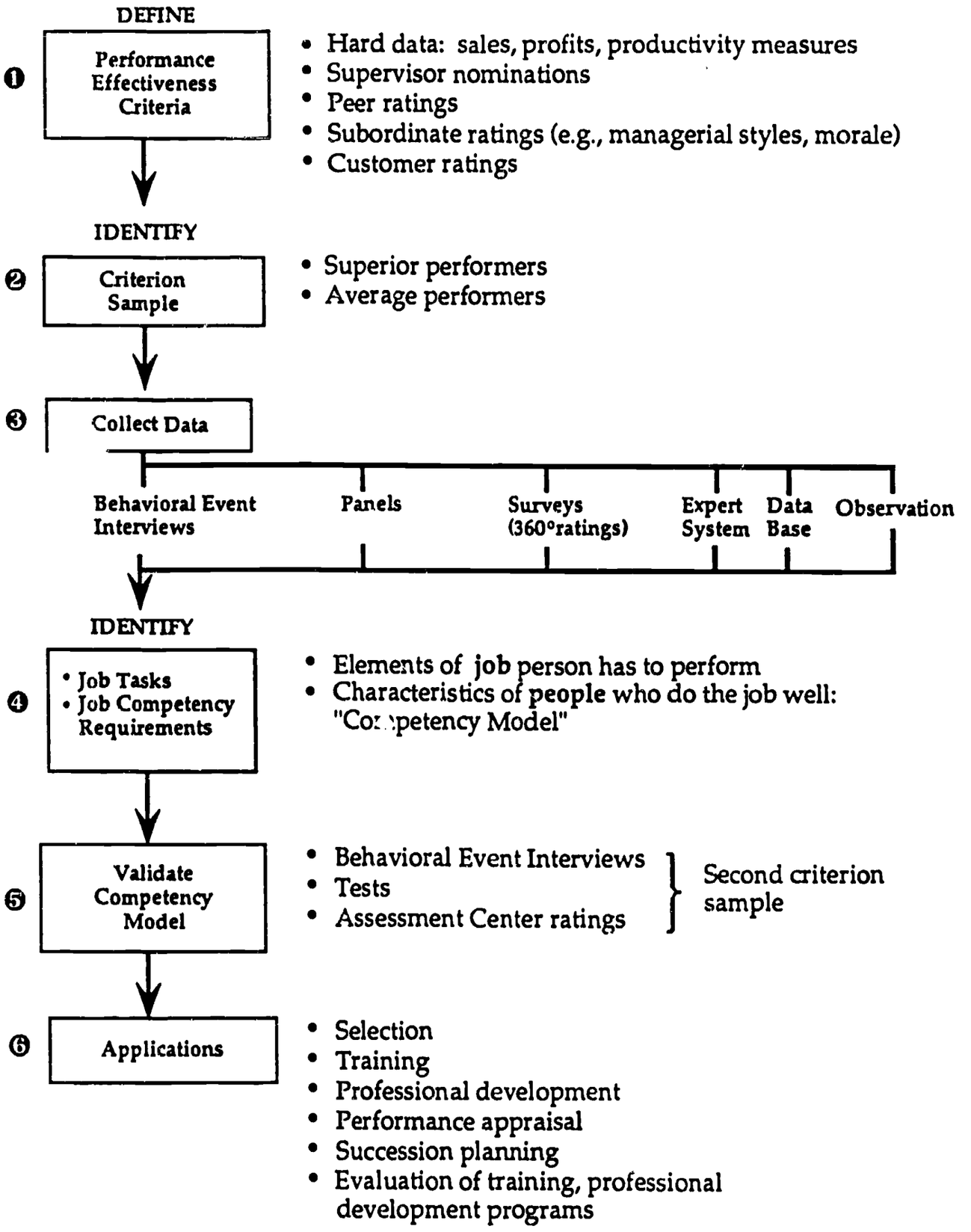
## APPENDIX D: MANAGERIAL AND PROFESSIONAL COMPETENCIES

| Type of Job | Competencies Which Are Most Critical at This Level of Job | |
|---|---|---|
| Executives | • Achievement Orientation<br>• Initiative<br>• Use of Concepts<br>+ • Pattern Recognition<br>• Self-Confidence<br>• Concern with Personal Impact | + • Organizational Awareness<br>• Interpersonal Sensitivity<br>+ • Use of Influence Strategies<br>+ • Group Management<br>• Relationship Building<br>• Flexibility |
| Managers | • Achievement Orientation<br>• Initiative<br>• Tenacity<br>• Analytical Thinking<br>• Use of Concepts<br>+ • Self-Control<br>• Self-Confidence<br>• Concern for Order | • Interpersonal Sensitivity<br>• Direct Persuasion<br>+ • Directing Others<br>+ • Relationship Building<br>+ • Developing Others<br>+ • Flexibility<br>+ • Concern with Personal Impact |
| Individual Contributors | • Achievement Orientation<br>• Initiative<br>• Tenacity<br>• Analytical Thinking<br>• Use of Concepts | • Technical Expertise<br>• Self-Confidence<br>• Interpersonal Sensitivity<br>• Direct Persuasion<br>• Concern for Order |

+ = competence added to this level

McClelland, D. C., Spencer, L. M., & Spencer, S. M. (1990, August). History and state-of-the-art of "job competency assessment" methods. Paper presented at the annual conference of the American Psychological Association, Boston.

## APPENDIX E: JOB COMPETENCE ASSESSMENT PROCESS




Ref: Lyle Spencer, *Soft Skill Competencies* (Edinburgh: Scottish Council for Research in Education, 1983.)

McClelland, D. C., Spencer, L. M., & Spencer, S. M. (1990, August). History and state-of-the-art of "job competency assessment" methods. Paper presented at the annual conference of the American Psychological Association, Boston.

**ALVERNO COLLEGE**
Milwaukee, Wisconsin
Division of Arts & Humanities

## Appendix F: Behaviors Characteristic of the Critical Thinker[12]

| BEGINNING CRITICAL THINKER | DEVELOPING CRITICAL THINKER | ADVANCED CRITICAL THINKER |
|---|---|---|
| **Systematic Thinking**<br><br>(The critical thinker is careful, accurate, and coherent in observation, judgment, and communication.)<br><br>1. Strives to notice as much as possible in the object of her thought (e.g., a statement, a book, a work of art, behavior).<br><br>2. Recognizes that there are appropriate sets of concepts (specialized vocabulary) for describing different kinds of phenomena and generally uses that language appropriately in communicating her observations.<br><br>3. Distinguishes between what she observes and what she says about the object of that observation.<br><br>4. Independently identifies and uses conceptual frameworks to organize and synthesize her understanding of that which she has observed and to communicate that understanding to others.<br><br>5. Actively seeks to make connections among various experiences (different readings, different courses, own experience, current events) and formulates general patterns which help to make sense of these experiences. | **Critical Self-Consciousness of the Thinking Process**<br><br>(The critical thinker recognizes that all knowledge is problematic rather than absolute because culturally conditioned assumptions influence our perception of life and the significance we attach to it.)<br><br>1. Always seeks to identify the culturally conditioned assumptions which influence her perception and judgment and the perceptions and judgments of others.<br><br>2. Recognizes that perception and judgment may only be valid within a certain context or situation (i.e., as opposed to being universally valid).<br><br>3. Specifies the contextual limits within which her perceptions and judgments may be valid; demands this specificity of others.<br><br>4. Evaluates the perceptions, judgments, and behavior of others relative to their context (i.e., withholds absolute judgment).<br><br>5. Recognizes that experience may have multiple layers of meaning; sees beyond the literal meaning; shows tolerance for ambiguity, uncertainty, "loose ends."<br><br>6. Is willing to question the assumptions and validity of her own perceptions and knowledge and those of others.<br><br>7. Seeks authority (the knowledge and experience of others) as a guide to understanding and action, but ultimately takes personal responsibility for all of her judgments. | **Reaching Beyond the Conceptual Frameworks Which Currently Shape One's Consciousness**<br><br>(The critical thinker sees knowledge as a endless process rather than a finite object; the critical thinker, therefore, habitually seeks out different experiences as resources for personal and societal growth.)<br><br>1. Actively explores complexity instead of ignoring or stepping around it.<br><br>2. Sees problems and issues in a broader perspective than that of her own culture or interest group.<br><br>3. Actively seeks a critical understanding of alternate points of view and ways of knowing.<br><br>4. Has the capacity to mediate between different points of view and to integrate diverse views.<br><br>5. Makes personal judgments only after examining multiple contexts and multiple perspectives, and, even then, recognizes the limits of her judgment.<br><br>6. Works to promote critical thinking in others through sensitive communications designed to enhance self-consciousness of assumptions.<br><br>7. Deals with issues of human understanding (e.g., truth, relativism, world view) as matters of personal significance rather than as academic exercises or interesting diversions. |

Roth, R., & Riordan, T. (1984). Behaviors characteristic of the critical thinker. Milwaukee, WI: Alverno Productions.



[12] These behaviors were developed by Professor James Roth (History) and Professor Timothy Riordan (Philosophy) for use in an interdisciplinary liberal arts course, "Bridging the Cultural Gap," at Alverno College.

**Appendix G: Example of the coding of Achievement Actions, Positive Regard and Development of Organization Power.**

SITUATION:
I developed and continue to work with a computerized system that measures the times various nursing activities require, and then totals the times as nurses entered the activities.

When the system actually began to operate within the hospital and staff, who are users of the system from the standpoint of being the ones that have to enter the data, and the system would not be a good system unless staff nurses consistently entered data and believe that they should be accurate with it. And as I recognized that staff nurses respected the system and had confidence in it and said, "This system tells what we are doing," as opposed to the system we had used in the past that had little support of the users, that made me feel that it wasn't just that I thought that we had done a good job. That it really is a good system and made me feel it is a system should be published or it should be broadcast.

As I have been moving along through this project of developing this computerized data collection system, I did keep track of what I did so that I would have a lot of minutes of meetings. I carefully planned meetings so that I always had agendas. I worked with a lot of different groups of people, and so I had a lot of information that I could then look at when I thought about writing an article and submitting it to the international society.

I had encouragement from a nursing administrator and from the head of a technical department who said, "This should be written up. This is an excellent system; let's write it up; let's get it out there." Probably one of the big factors that led to actually doing it would have been the head of the technical department who

Achievement Actions (10B2 and 10B3)

Development of Organizational Powe continued (31A1)

**Appendix G (continued): Example of the coding of Achievement Actions, Positive Regard and Development of Organization Power.**

said that he would be very happy to work with me on it. He has a word processor and did a lot of the mechanics of putting the article together. He would take a lot of what I had and get that into print so that we could start looking at it. That was certainly a big reason for moving ahead with it too.

Development of Organizational Power continued (31A1)

THOUGHT/FELT:
When I began I wanted to tell about the system. By the time I had completed the article, I wanted other people to know what the system was, and that was more important to me. But when I began, I really wanted to tell all the things that I had done.

ACTUALLY DID:
To Get Started With the Publishing, I began by looking at all of the information that I had that led up to the system. And then I did an outline of what I thought others would want to hear from within the context of the information that I had about the system. The article had to be shortened considerably because I began with taking all of the data that related to the various points in the outline and then pared it down from there. I knew it had to be shortened because we had page number constraints.

To Shorten the Article, I started by taking just what, I thought, had to be included. The really pertinent information: that if that was missing it wouldn't make much sense. And I tried to keep in mind that if you can tell what it is you are doing, why you're doing it, what happened when you did it, and what are the results that you see. By this time it was already in pros. I probably had to do three revisions before I had it to the right length. Again, I had help from the head of the technical department with the revision process, but primarily again it was looking at what would be the points that would interest people. I did have to let go of some of what interested me the

Positive Regard

**Appendix G (continued): Example of the coding of Achievement Actions, Positive Regard and Development of Organization Power.**

most and some of my pet parts that I felt were just absolutely vital to be said. But I did make myself look at it as if I were a hospital administrator. There are people from all areas of health care, a lot of physicians, and I had to consider what would interest them as opposed to what was important for the nursing staff.

Positive Regard continued (22B2)

The head of the technical department was very helpful in that he put everything on his word processor and so as I would revise things, he would bring them back to me for further review and revision. And he would again pull back the latest copy of what I thought we should have. Then after I agreed that it was the way I wanted to submit it, he did do the final preparation of putting it onto the big papers that you have to use. He just did editing. I did put him on as co-author because we had worked on the project together. He has since published a paper from his department's standpoint on the same system which he is just using the material that I had developed, and he put me in as a co-author. We had agreed to that.

OUTCOME:
The article that I had submitted to an international society that holds a conference every three years was accepted for publication in the proceedings, and then I was also asked to present the paper. That was very satisfying because I felt that the system that we have in place is really very sophisticated, and I personally have felt that it's probably one of the best ones that I've been able to see anywhere. It made me feel that other people at least felt that it was a good system if they wanted me to come in and present it.

Development of Organizational Power (31A1)

When I presented, I had a great deal of positive feedback with people from other countries even commenting to me personally that they felt it was the

**Appendix G (continued): Example of the coding of Achievement Actions, Positive Regard and Development of Organization Power.**

best presentation of a five day conference. As I thought about that, I really believe that the reason I got that kind of feedback wasn't because of my presentation, but because I did stick to being able to present something that "This is how we did it; this is what it is; this is how we did it; these are the results," whereas many of the presentations were done simply from description of a system as opposed to being able to say "this is what it is; etc."

Note: This write-up was coded for many abilities in addition to efficiency actions, positive regard, and development of organizational power. For the sake of clarity, those codes are not included on this sample.

Review of Marcia Mentkowski, "Designing a National Assessment System: Assessing Abilities That Connect Education and Work"

Reviewed by: Richard L. Larson, Lehman College of The City University of New York

If I am reading this document correctly--and I am not sure that I am, because it is long, densely detailed, and, I am tempted to say, apparently repetitious--it proposes that the assessment of national educational goals, in particular Goal 5 (our responsibility), be based upon whether the examinee can apply knowledge reached, concepts understood, and abilities developed, and interpersonal skills attained, to activities engaged in and problems encountered by the student, evidently over a period of several years after receiving the degree, on the job and as a citizen. That is, Dr. Mentkowski seems to be saying, as I read her, that what's worth assessing, what needs to be assessed, is the graduate's developed ability to perform effectively in the workplace and in the world of human interaction. There does not seem to be any suggestion that we should assess the abilities of the college graduate as she leaves the campus with her degree in hand. What matters, I infer, is what she does with her education when she goes to work. Mentkowski asserts, as I understand her, that the procedures and anaytical tools for assessing students' performance in professional or other work-related settings are available--Alverno has invented them (partly from studies of Alverno alumnae and of non-Alverno graduates who are active in professions), tested them, and applied them--and we can apply them in carrying out our responsibilities.

Dr. Mentkowski offers a lengthy argument for that approach to assessing the outcomes of instruction, and for the proposition that specific kinds of assessment activities can yield the information we need in order to determine how well the student can integrate communication skills, critical thinking, and problem solving with the skills in observation and human relations required in work settings. All of these phrases are apparently viewed by Dr. Mentokowski as a sort of shorthand for calling to mind the "multiple" [p. 22] abilities required for success in the workplace. These enumerated assessment activities can reveal whether the student has and can display the "integrated, developmental, and transferable" abilities ("abilities" is the key word: not "knowledge," not "competencies," but abilities--complex abilities [pp. 12, 17]) required in the workplace and in the world of civic affairs. For Mentkowski, these abilities include that of being able to "sustain" learning after college; the well-prepared graduate has "learned how to learn."

Mentkowski cites large amounts of research, much of it performed by the Alverno faculty and much of it indeed her own (often conducted in collaboration with others), in support of the general argument and of the specific actitities proposed. Most of the research she cites is unfamiliar to me, and I can't appraise its cogency, but Alverno has a record of such thoroughgoing application of assessment and such consistent assessment of assessment, if you will, that one is not inclined to be skeptical of her claims about what people at Averno have done and can do. Furthermore, the paper and its appendices present so many conceptual frameworks and subframeworks, at high levels of abstraction and generalization, that one finishes the paper guessing that the Alverno people must have thought of all the possible concepts and interconnections of concepts one might imagine for describing critical thinking and problem solving as enacted in specific professional situations.

The preferred technique of assessment (many procedures are listed and discussed more briefly) appears to be to interview the graduate, and/or to analyze a record of a specific incident in which the examinee has to demonstrate abilities for the assessor to analyze (and/or to collect a portfolio in which the graduate demonstrates her abilities). I connect the procedure to other procedures for assessing professional competence that I have heard about--those for assessing the abilities of medical students and doctors, for instance. The technique relies on the study of performance in context, and on the analysis of the characteristics of performance. The technique does not simply test recall through some sort of written instrument, or test problem solving ability by presenting students with a written problem or with problem-posing materials (a la Morante); it requires oral or extensive written discussion of a naturalistic situation. The evaluator, I infer, constructs a profile of the performance in context, and evidently determines from that analysis whether the examinee is "integrating" and applying her learning as expected and desired.

My responses to these proposals, as I understand them (if indeed I am correct in understanding that they are Dr. Mentkowski's proposals and suggestions), are principally three. First, I am not sure I understand that our assessment of students' communication, critical thinking, and problem solving abilities might best occur some time <u>after</u> the student has completed undergraduate work, or that it might best be carried on in the context of a workplace. (The three phrases naming the abilities to be assessed do not specify that they are to be assessed in the workplace, though the "briefing paper" for authors of position papers invited authors to think of abilities that would be or are enacted in the workplace if the authors so desired.) Assessment carried on in a workplace may give evidence not mainly about a student's abilities as developed in a college

or university, but also about the graduate's on-the-job training and experience. To be sure, there is no reason why on-the-job experience should not be part of what a graduate brings to the assessment, but if such experience is going to be included in the preparation to be assessed, how far beyond college experience do we go? And if we go beyond college experience, are we learning how well we in higher education are achieving, generally, our educational goals, or something else (e. g., how fortunate the students are in getting positions that offer good workplace training)? It's clear from discussions in the middle of page 3 that Mentkowski is aware of this problem, but I'm not sure I see exactly how she addresses it.

Second, given the complexity of arranging assessments of students with workplace experience, how practical is it to try to arrange such assessments? How does one reach the people one wants to assess, after they have scattered following graduation? How does one enlist their willingness to participate in an assessment? What is one assessing: performance in a situation created (artifically) by the examiner, or in one occurring naturally? And if one is looking at a natural situation, how does one assure the essential comparability of incidents and workplace situations, from student to student, so that as investigators we can be sure that we are learning comparable findings about examinees--so that, in turn, we can generalize from what we learn? For a nationwide study, how can we be sure that the institutions whose graduates we study take a similar view of how knowledge and ability come together in the workplace? Could we, furthermore, train the numbers of investigator/observers we would need in order to get any sort of a national sample of the performances of college graduates? Given what Dr. Lenth has taught us about the wide variation in interest in assessment from state to state, could we hope to get any agreement about educational leaders, public and private, in various states, about the value of carrying on this complex process? And, given what Dr. Meranto has taught us, could we be sure that an initial agreement, however hard won, would survive shifts in political winds from state to state and in the nation?

Third, how does the assessment procedure described by Dr. Mentkowski work, anyway? What kinds of behavior are selected for examination? How are they selected? What exactly is the procedure for determining the characteristics or quality of the performance given? Who makes those decisions and how are these people trained to make them? (In a national assessment, we'd need lots of interpreters and lots of people to train the interpreters.) What exactly is <u>looked at</u> in the performance, against what criteria or evaluative grid? There are, it would appear, different kinds of interviews and strategies for interviewing, and I gather that there would need to be, in a large-scale study, some agreement about the kinds of interviews to be undertaken. And, if we need

to do so, can we make the appraisals of the individuals studied comparable enough so that we can reach some conclusions? Can we train the people who will conduct the interviews and appraise the performance? (Mentkowski, to her credit, recognizes--p. 47--how different backgrounds of different interviewers/analysts might lead them to focus on different features of behavior, and perceive different abilities.) From the position paper, I find I can't really answer these questions, and I need to, before I can make a judgment about the value of these proposals to us.

I could wish that the paper had been shorter, and more sharply focused to this last group of questions, instead of being quite so well stocked with theories about learning and behavior and with citations to writings not familiar to me (nor, I'd guess, to most of us) and not easily accessible to those who would want to confirm the assertions made about what those citations seem to establish.

But I'm struck, finally, as I ponder the essay, by the emergence for me of two "abilities" that Mentkowski discusses and one that she does not explore explicitly: I'm led to ask to what extent the college graduate ought to display these abilities, and whether our assessment ought to (and can) address them. They are:

(1) the ability, in Mentkowski's words, to take "achievement actions" [p. 9]: not simply to "solve" problems but also to put the solutions into action through what might be a series of related steps;

(2) the ability [also p. 9] to "have a positive influence" in an organizational context: in effect, to lead or even inspire others to work better within an organization;

(3) the ability [Mentkowski does not name it directly, so far as I can see] to <u>identify</u> or <u>recognize</u> or <u>pose</u> problems--an ability that may need to accompany or precede the ability to <u>solve</u> the problems. (Richard Young, the well-known rhetorician, once remarked that knowledge or wisdom begins "with a furrowed brow.")

The first of these three abilities can probably be assessed in a performance interview; the second may be difficult to assess except in a sort of wide-ranging interview about the person's overall accomplishments in the workplace. The third should be open to assessment through interviews or invitations to writing (as in writing about a "case" in an administrative setting), and it may indeed be one of the abilities that we ought most directly to look for in our college graduates. We should consider whether these abilities, especially the third, should be on our agenda for assessment.

Review of:

Marcia Mentkowski: Designing a National Assessment System: Assessing Abilities That Connect Education and Work

By: Ted Marchese and Barbara Wright

An outstanding piece of work! We learned an enormous amount from this paper, which led us to a much deeper appreciation of the richness and complexity of the three abilities and convinced us of the importance of assessing the abilities in context.

It now seems unthinkable to us to operationalize the three abilities strictly in terms of on-campus considerations; we need employers and other citizens at the table, all the more so because Goal 5 explicitly places these abilities in relation to citizenship and workforce development. The paper also makes a persuasive case for the need to assess the three abilities in use, and this may well mean looking at additional factors like interpersonal and "learning-to-learn" skills.

To all that, we say Bravo! Let's keep this paper close at hand and remain open to its implications as we explicate the abilities and ponder their assessment. While the recommendations presented here are ambitious, they are also properly sensitive to the complexity of the three abilities and solidly backed by research as well as Alverno's extensive experience. By linking assessment of the three abilities to both accountability and improvement agendas, the paper suggests that one system, appropriately conceived, can serve both masters. If we follow this paper's lead, the effort to generate valid judgments will require significant investment -- but at least we'll have some assurance that that investment is serving educational ends.

POSITION PAPER EVALUATION
STUDY DESIGN WORKSHOP
HIGHER ORDER THINKING AND COMMUNICATION SKILLS
NATIONAL CENTER FOR EDUCATIONAL STATISTICS
17 - 19 NOVEMBER, 1991

Paper Reviewed: Designing A National Assessment System: Assessing Abilities That Connect Education and Work
by Marcia Mentkowski
Alverno College

Reviewer: Ronald G. Swanson
Associate Director, Texas Academic Skills Program
Texas Higher Education Coordinating Board

This paper was an impressive collection of information and ideas about what should be assessed and how to assess abilities that link education and work. I was envious of the personnel, time and funds that must be available at Alverno College for assessment research. I was also impressed with the innovations, follow-up, and depth of the Alverno effort.

The paper was detailed with regard to the specifics of what is done at this fairly small private college. However, the author wisely distilled a number of lessons learned and made some recommendations, based on the research conducted, about how the results might be applied to a national assessment of higher order skills - among other things. All of this information notwithstanding, I came away from the paper with some concerns about the applicability of the results cited in the paper to a national assessment effort. In this review, I will address some of those concerns. Please keep in mind that my concerns are not necessarily with the Alverno model itself, but rather, at least at times, with more generic issues raised in the paper. In addition, I must point out that many of my concerns were not with what should or could be done, but rather with what I feel can realistically be done at this point in time.

As early as the introduction, I was confronted with the issue of when higher order thinking skills are learned. One of the assumptions made in this paper was that the context for relating education and work includes before, during and after college. That being true, one has to continue to wonder about where intervention should be placed or aimed if we are to substantially increase the proportion of college graduates who demonstrate advanced thinking skills - if, in fact, we are going to intervene at all rather than just report. Hence, I repeat in this review a point I have previously made in others - that the purpose of any assessment program must be made clear from the outset. Are we to simply report or take a more active role in making the desired outcome come about?

At the risk of being too narrow in perspective, it was my belief that the purpose of these papers, reviews, etc. was to look at ways to address the fifth objective under the fifth national education goal delineated by the

President and governors. While the fifth goal does talk about competing in a global economy and exercising the responsibilities of citizenship, the fifth objective itself is much more limited in scope. Figuring out a way to accomplish the fifth objective will be a Herculean task without attempting to directly assess abilities that connect education and work. I believe it was to be assumed that an improvement in higher order thinking skills would defacto enable graduates to perform better on the job. Please understand that I am not saying that we should not attempt to directly link education with work. What I am saying is that such an effort is, in my opinion, beyond our charge and perhaps not possible in the time frame available. My plea here is for realism.

The previous point also calls into question the seventh assumption made in the paper - that readers will accept the idea of a national assessment system rather than a single national test. In an ideal world I would be the first to agree with that assumption, but in the real world it would appear to me that costs, time constraints, and a host of other limitations might very well drive us to some sort of single national index in order to meet the immediate objective.

The first recommendation in the paper was that "A national assessment system should assess for abilities that connect education and work." This, of course, assumes that we will go with a national assessment system which I have already questioned. It also drives us back to the issue of realism. Can we objectively relate skills acquired in education directly to the myriad of jobs that exist in our work world? And if there are generic skills that apply to most occupations, wouldn't those be, or at least include, the ability to think critically, communicate effectively, and solve problems regardless of specific occupation?

The author, at one point, develops the idea that "abilities that may be differentiated during the first two years of college become integrated during the last two years, although how this happens is not clear to us now." This is an important finding that makes it clear that however we decide to go about the assessment of higher order skills, we must not do it until near or after graduation from college. Whether we should wait until the graduate has been in the work force for several years as suggested in this paper is another issue related to what is practical and how strongly one should attempt to tie the assessment of education and work skills.

The second recommendation in the paper has to do with a national assessment system defining abilities with multiple components that should be assessed on the job within appropriate contexts. Here, again, I must question the practicality of such a system on a national scale. The author's contention that "effective assessment means linking information on how students come into a program to how they graduate, and relating those changes to the curriculum", leads me to wonder about whose curriculum we might be dealing with on a national scale. Will a national scale assessment program be

able to assess individuals and provide them with individual feedback in addition to feedback to their institutions of higher education? Again, that would be great, but is it feasible in light of the charge and the resources available?

The assessment system described in this paper made great use of the contention that interpersonal and intellectual skills were equally important for effective performance and that interpersonal ability is an important outcome of college. Allow me to once again become a bit skeptical. Are we to assume that interpersonal skills are primarily a college-developed set of skills? If so, that would be saying an awful lot for the relatively few years spent at college, and would minimize the earlier, much longer, more developmental periods of a person's life. Assuming that the contention is true, and that we can and do assess both sets of skills together, what would be done with such information? Would it be fed back to individuals and/or their institutions on a national scale?

One of my biggest concerns about applying the Alverno model nationally is its dependence on lengthy, complex interviews. First, as has been pointed out often in the past, interview data can be called into question for many reasons - lack of standardized administration, variable judgments about what is to be recorded and what is not, the subjectivity of data obtained orally in a face to face setting - to name a few. Even if some of those shortcomings could be dealt with (and some of them can), how in the world could the interview technique be applied on a national scale?

I was also a bit concerned about using experiential reports obtained during interviews as a basis for determining how students learn. I guess that all of my previous experience with the rigors of the scientific method leaves me less than enthusiastic about building a body of data based upon subjective reporting.

The emphasis throughout the paper on the importance of self-sustained learning was not only well documented, but also important to life-long goals and careers. My concern with this aspect of the paper came in conjunction with the fourth recommendation which stated that "a national assessment system should assess self-sustained learning and should include feedback and opportunities to self-assess." I return again to the issue of what is practical on a national scale. Can we realistically expect a national assessment to provide individual feedback? Further, is it realistic to expect that we will be able to nationally track graduates in their occupations to determine both an improvement and accountability agenda? And if we did and we found deficiencies, who should be held accountable for them? Where would we go to remedy the situation for future graduates?

In summary, I found the Alverno assessment work both interesting and detailed. As I have previously stated, my concerns are with the practicality of the approach on a national scale. While I have already dealt with a number

of specific issues from the paper, I would like to close this review by summarizing a few generic concerns that this paper brought to mind.

1. The purpose and scope of the task at hand were, in my opinion, much more limited than the Alverno model would consider. Throughout this review I have hearkened back repeatedly to what I saw as the charge - Objective 5 of Goal 5! If that is not the charge, then the fault lies in my misperception.

2. A national assessment of higher order thinking will almost of necessity have to be summative in nature and all terms will have to be carefully defined operationally. In other words, if this assessment effort is funded and supported like other such efforts I am familiar with, we will be very limited in what can be done. Tracking students in their jobs, extensive interviewing, individual feedback, etc., will simply not be possible. It is likely that a single assessment at or immediately after college graduation will be what occurs and this would not fit the Alverno approach at all.

3. A national assessment effort would likely have to be done on a sampling basis across states and that would not make individual feedback to students and institutions feasible. Then, too, it would have to be decided what the assessment's purpose is. Would it be simply to report national results (like the NAEP reports) or would the results be used to promulgate change/improvements to the educational establishment? How would the individual states react to such an effort - unless of course they had agreed to it beforehand - and how likely is that?

4. Regardless of the purpose of the assessment effort, the first year or two of assessment would have to be done simply to establish baseline data. How else would we know if we are "substantially increasing" the proportion of college graduates with advanced higher order skills?

5. How applicable are the overall results of the Alverno research to a national assessment of higher order thinking skills? Since the persons used in the study were primarily, if not exclusively, women, how much can we generalize to the college population at large? There is a growing body of literature which indicates that males and females process information differently and it has long been established that females are much more adept at verbal activities than males. Hence, is it possible that males would not interview or reflect in the same way that the females from Alverno do? I would feel a lot better about the findings and recommendations of the paper if males had been sampled in numbers proportional to the U.S. college population.

# Response to Reviewers of DESIGNING A NATIONAL ASSESSMENT SYSTEM: ASSESSING ABILITIES THAT CONNECT EDUCATION AND WORK

**Marcia Mentkowski**

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Thank you, reviewers, (Ted Marchese, Barbara Wright, Ronald Swanson, Richard Larson) for your careful and thoughtful reviews. Two of the reviewers, Richard Larson and Ronald Swanson, stated that a national assessment system should focus its attention on assessing college students as a first priority. I agree, and my paper's companion piece (*Designing a National Assessment System: Alverno's Institutional Perspective* by Georgine Loacker) develops that argument. Swanson argues that following up graduates and researching abilities in the workplace is somewhat off the main charge from the National Goals Panel. I understand the general question to be, "Given that a national assessment system will focus primarily on assessing the college student, what is the rationale for investing in assessment of graduates after college?" "Can we entertain such an investment in light of some of the practicalities of implementation we face, and the press for immediate results?"

Clearly, the primary focus of a national assessment system will be on college student performance. My charge, however, was to assume that public expectations and future needs will not be met with such a singular focus, and to consider the broader sweep and context for developing a national assessment system that puts the relationship between college learning and work front and center.

A major source of criticism from employers is that college students are not performing adequately. Swanson may be right, that we can assume that an improvement in higher order thinking skills would defacto enable graduates to perform better on the job. As an educator and researcher, I can point to some evidence that he is right. I cite it often. But as I see it, the public is not buying the kind of evidence we have so far for the links between education and work. We have lost the public trust.

I agree that our first obligation is to improve the system, but improve it how? Once we start, a myriad of questions will arise about what should be assessed, who will set standards, and which standards will be acceptable both to higher education and employers, such that each would make a considerable investment in the activity.

In my experience, the accountability and improvement purposes of an assessment system are not met in the public eye unless the system generates information that considers what the workplace thinks graduates need to be prepared for, and whether their bottom line is met—improved performance in *their* arena. Employers expect that the standards for performance that colleges set and that are illuminated through the National Goals are ones that will really make a difference after college. Further, the public will, I believe, buy in when they are confronted with standards that are set in part by what is needed now. Higher education will buy in when a system generates information that allows them a look at future needs and demands so they can do what they think they are best at—preparing students with abilities that last a lifetime.

Swanson hoped for a less complex, and therefore, more practical approach. Me too. Frankly, I would never have guessed in the early design of an institutional assessment system that the dual purposes of accountability and improvement meant what they eventually did. They meant following graduates to take a serious look at their performance, and investing in research on the abilities of outstanding performers that would help faculty refine what to teach for and make them confident that their teaching is future oriented and not confined by present standards.

I learned quickly that developing the public trust is essential for this institution (with no endowment, with students who are generally first generation college students on financial aid, with over 20% minority, with tuition kept low—$6,390 annually—to compete with public institutions) especially since most of our graduates work right here in the community! Frankly, taking up the issues of relating education to work by following up graduates and researching abilities at work was one of the most practical decisions we made. Was it feasible? No, not at first, it was not even our first priority. Ultimately, however, we had to deal with these issues. Will a national assessment system experience demands for such public accountability? If I read *America 2000*'s tone and tension, it is precisely these issues that are at the heart of an effort to reclaim the public trust and improve higher education's ability to deliver.

Finally, Larson would have appreciated answers to more of the specifics. He wondered why I spent so much time (and space) developing theories of learning and behavior, and not more on giving the specifics of how the assessment and research ideas would actually work in a national assessment system. That is the next step, once our educational assumptions and theories about student learning and behavior are clarified in a conceptual framework for an assessment design. In my experience, it is precisely the assumptions about how people learn and how they integrate performance in complex situations that are critical to designing an assessment system. An assessment system is a means to an end; it serves educational purposes. Any assessment system that serves the 21st century will need to consider the most advanced ideas about how students learn (and we're not there yet!), if only to meet the increased demands for more efficient, long-lasting, and meaningful instructional and assessment processes.

A national assessment system will need to be educationally and theoretically grounded in how students learn and develop. First, a conceptual framework and a broad design must be in place that reflects the shifts in assumptions we care about (e.g., to assess what students know *and* can do) and the sweep of issues and concerns we face. Then, we can, as a group, take up issues surrounding implementation and the more exacting procedures that flow from the design. We can take up the insightful questions Larson raised that would enable us to get a better handle on just how such a system would work. The more specific descriptions of performance interviewing and analysis Alverno and others have prepared, that are cited, are available. But our experience suggests that it is critical to invite our colleagues from the business and professional community who are experienced in various forms of assessment in the workplace to join in the activity.

I certainly appreciate the care and consideration that all the reviewers gave to my paper. I will consult the feedback frequently as we continue to work on these issues here at Alverno and will factor it in during the many situations where groups of us have an opportunity to work toward the National Goals.