Milestone
Planning and Research Inc.

A Standard for the Delivery of Instruction and Training to Knowledge Workers: The OJEI℠ Method

A Modern Day Apprenticeship Approach to Improving Knowledge Transfer, Productivity and Outcomes Assessment

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Training Methodology, Evaluation Criteria and Certification Standard for:

- Integrate classroom instruction and on-the-job training for a faster return on training investments
- Deliver effective educational internships, school to work programs and apprenticeships
- Develop “fast track” apprenticeship programs for IT and business professionals
- Ensure outcomes assessment and results measurements from workforce development initiatives
- Provide more efficient knowledge and skill transfer from consultant to client on projects
- Improving the performance of project teams
- Instructional compliance criteria to support the public workforce investment system

As Used In DOL Authorized Industry Apprenticeships

Includes Supplement for Compliance Assessment

Includes SKAT Coaching Software Sample Reports for Skill Tracking

Milestone Planning and Research Inc. OJEI Compliant Provider

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Table of Contents

1.1 Purpose of This Standard

Highlights

There is growing concern among CEO's that U.S. corporations must rekindle an emphasis on execution in order to compete effectively in a global economy. To meet this challenge U.S. corporations turn to the educational community, among others, for help. Yet simultaneously there is also a growing awareness that our educational and training organizations have remained stagnant and are losing their edge in preparing a workforce with the skills necessary. This is especially relevant in the managerial occupations and in occupations requiring the efficient execution of projects.

So, what is to be done? This document, a standard for apprenticeship-based teaching, serves as a solution to this educational problem by bringing 21st century apprenticeship concepts to educational and training organizations as well as to employers. The foundational principles of this standard are anchored in the timeless principles of apprenticeship that have been updated to address the needs of modern day Knowledge Workers in a technologically driven economy. This standard is especially relevant to managerial and technology-based occupations involving Knowledge Work and involving the execution of investment projects.

The Kind of Change Needed

Educational institutions have been the cornerstone of the American "intelligentsia" who provide thought leadership on academic philosophy. These institutions have also been the primary providers of workforce development for the country. Employers and students rely upon these institutions to prepare, qualify and credential prospective workers for entrance into the labor market. In addition, employers frequently contract these educational institutions to provide the knowledge transfer necessary to update the skills of existing employees.

The traditional off-the-job classroom method of instruction has remained the dominant teaching approach for years. Similarly, performance on written examinations by students has remained the generally accepted validation approach used by educational institutions for judging whether or not student-learners are ready to enter into the workforce or to advance in their occupations. The combination of off-the-job, classroom instruction in tandem with the administration of written tests has remained a primary, time tested approach for developing and qualifying our workforce. But higher education has become complacent, and the time has come to challenge this approach. The shifting of classroom instruction to on-line instruction is not the answer. On-line delivery relies upon the same basic modality as in the classroom. It may reduce costs and add convenience, but it only transfers the problem from one media to the next.

To meet the needs of their constituencies these institutions need to update their processes and do a better job at preparing the managerial and "Knowledge" workforce. The "tried and true" educational delivery methods will not remain good enough much longer if we are to provide employers with a workforce that yields global competitive advantage. These institutions must improve upon their delivery process by removing the barrier between the classroom and the workplace, or they will be soon replaced by organizations that better fulfill the employers' needs for a competitive workforce.

The use of the classroom instructional modality reflects a long held bias within the educational community that "knowing" is dominant to "doing". Along these lines academic credentials are awarded on the basis of the learner doing nothing more than demonstrating knowledge in a classroom setting and on a written examination. But in today's knowledge-based workforce, "knowing" is not enough. Both "knowing" and "doing" successfully on-the-job are the required essential components of worker preparation.

In today's knowledge-based workforce a gap exists for both the employer and the worker when the traditional classroom-based credential is awarded and the training experience fails to include

a formal "on-the-job" component. Sophocles once said: *"One must learn by doing the thing. For though you think you know it, you have no certainty until you try."* Without an on-the-job learning component the training and education delivered is incomplete and the value of the credential uncertain. In addition, without an on-the-job educational experience the required orientation to get things done, even the non-glamorous things, can not be fully appreciated or understood.

The shortcomings of traditional instruction and the awarding of academic credentials explain why apprenticeships and residency programs have remained viable for many established occupations. Historically apprenticeship refers to the agreement between employer and worker for the exchange of labor for training. The critical component of apprenticeship for our purposes is the inclusion of structured on-the-job training and skill validation into the mix. Under the apprenticeship training modality the development process for the worker goes beyond the traditional off-the-job classroom instruction with written exams. Apprenticeship encompasses knowledge validation, skill validation, affective development and productivity demonstration on the job as well as in the classroom. It is a blend of classroom theory with on-the-job practice and coaching. We refer to this cycle as: the Knowledge→Skill→Productivity→Wages framework. It is a complete educational cycle that ensures the worker can: execute the work properly, bridge the gap between theory and practice and achieve a high level of performance on the job.

Under the Knowledge→Skill→Productivity→Wages framework of apprenticeship worker training and education may be viewed as an iterative cycle leading to greater productivity for the employer and steadily increasing benefits, job satisfaction and career growth for the worker. In this regard training and educational credentials awarded to workers are used as a gateway to greater competitiveness for employers and as a means to secure an improved standard of living for our workers. This is how the American labor market ideally operates. Unfortunately the current educational method of awarding credentials for the new breed of workers that we label "Knowledge Workers" tends to stop at the Knowledge phase without formal on-the-job training and skill validation.

The purpose of this standard is to provide the educational practitioner with a blueprint for adopting the apprenticeship modality. This makes the institution better able to fulfill employers' workforce development and educational requirements by extending the worker's educational cycle through the "Productivity" phase of the worker development cycle. On-the-job training is the essential part of the process whereby the learner earns a wage of some sort during the educational cycle.

Building upon this premise the current challenge to educators, employers and the public workforce system is to use this apprenticeship standard as a vehicle to participate in a more effective process of worker training and development for today's Knowledge Workers. Characteristics of this new process should : 1) encompass the full Knowledge→Skill→Productivity→Wage cycle, 2) be cost effective and straight forward to implement and 3) is based upon free market principles whereby all stakeholders willingly participate. This standard seeks to lay out such a process using a *free market apprenticeship* approach. This means that employers, students and schools participate voluntarily and individually because they benefit jointly. There is no necessary need for a guild or a union to serve as an intermediary.

We refer to this instructional approach discussed within this standard as On-the-Job Enabled Instruction (OJEI^{SM}). The OJEI approach advocates a seamless and integrated combination of off-the-job classroom instruction that is followed by structured on-the-job training and skill validation. In addition, OJEI's on-the-job training component includes skill coaching as well as affective/motivational coaching. OJEI works well with Job Instruction Training in an OJT setting.

OJEI provides educational institutions and training organizations with a voluntary, cost effective instructional method that augments and integrates their existing classroom instruction with an on-the-job component. OJEI facilitates the delivery of a consistent, measurable and predictable outcomes-based instructional method leading to productivity growth for learners.

Integrating on-the-job instruction into a traditional classroom-based delivery model takes time and requires relationship building between educational providers and employers. The conversion from the classroom-only modality to OJEI will be a journey and not an event. The hope is that this standard will help academic/training institutions take measured steps toward quality improvement in their processes that result in greater competitiveness for the American workforce and their employers. To this end the OJEI[SM] standard is accompanied by a tracking too called *SKAT*-- a competency based rating and evaluation database and reporting tool which helps the institution to secure compliance to this standard for any course or curriculum. The reader is also encouraged to read the accompanying document: *OJEI[SM] Compliance Checklist Supplement*. located in the appendix.

Educational and training organizations seeking to adopt the OJEI process can follow established implementation approaches toward compliance. Academic institutions and training organizations wishing to demonstrate and document compliance can be evaluated against the steps contained within this standard. Material deficiencies can then be identified and remediated over time. Then, once significant deficiencies are remediated, the institution will be deemed compliant to this standard.

By adopting OJEI educational and training organizations can break tradition and better serve their customers. To achieve the "culture of execution" that CEO's like Larry Bossidy www.honeywell.com/execution/bio_larry.html are looking for, the training and development process for these workers needs to reached a level of completeness whereby the cycle of Knowledge→Skill→Productivity→Wages flows through entirely. Having established this need, it is now appropriate to describe how we can meet these requirements efficiently. The stakes are high, and how we handle the development of these workers holds significance given our economic dependence upon an increasingly knowledge based workforce in a globally competitive world.

1.2 Focusing on Knowledge Workers—a 21st Century Challenge and Imperative

The website "What is.com" defines a Knowledge Worker as:

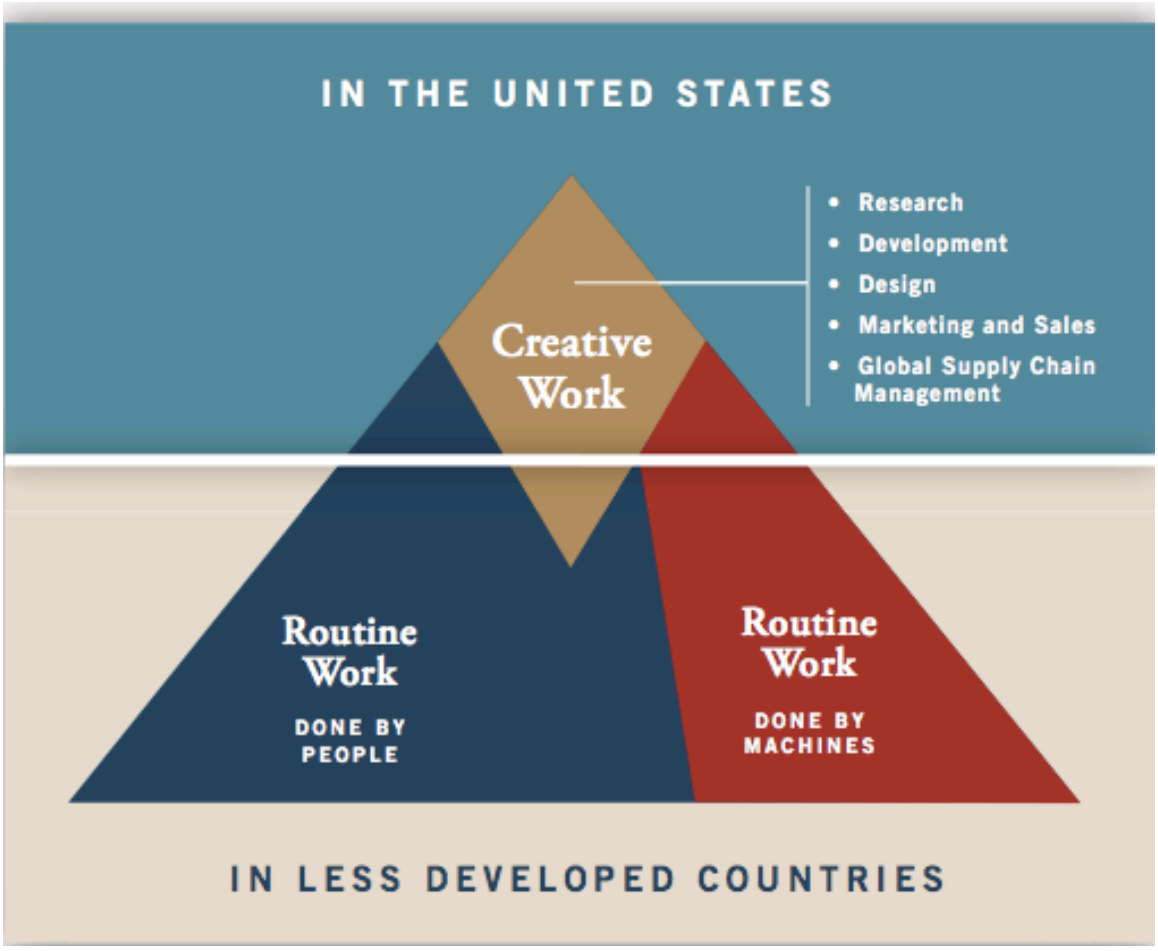
> A knowledge worker is anyone who works for a living at the tasks of developing or using knowledge. For example, a knowledge worker might be someone who works at any of the tasks of planning, acquiring, searching, analyzing, organizing, storing, programming, distributing, marketing, or otherwise contributing to the transformation and commerce of information and those (often the same people) who work at using the knowledge so produced. A term first used by Peter Drucker in his 1959 book, Landmarks of Tomorrow, the knowledge worker includes those in the information technology fields, such as programmers, systems analysts, technical writers, academic professionals, researchers, and so forth. The term is also frequently used to include people outside of information technology, such as lawyers, teachers, scientists of all kinds, and also students of all kinds.

Thomas and Baron (1994) www.cecer.army.mil/kws/tho_lit.htm defined "Knowledge Work" as all work *whose output is mainly intangible, whose input is not clearly definable, and that allows a high degree of individual discretion in the task*. Knowledge Workers frequently execute their work on projects. In the early 1990's the concept of a Knowledge Worker was a uniquely American occupation. Now, however, global competition has reached out to these jobs as well and threaten American dominance.

A report by the National Center on Education and the Economy (Dec 2006) addressed the skills requirements of the U.S. workforce in a global economy pointing to the future of Knowledge oriented jobs as well as jobs requiring more repetitive tasks. http://skillscommission.org/pdf/exec_sum/ToughChoices_EXECSUM.pdf . The study concluded that employers, now operating in a global labor market, have the ability to employ highly educated workers from developing countries at substantially lower wages than U.S. workers. The study also concluded that it is becoming progressively less expensive to automate functions that were previously performed by people. The authors envision a future in which most ***routine jobs*** will either be outsourced

overseas or replaced by a machine. The primary source of jobs remaining in the U.S. will be those requiring high levels of creativity and innovation. These jobs, such as research, development, design, marketing and sales and global supply chain management will likely be the jobs retained in the U.S. keeping only those workers at relatively high incomes.

The conclusion to draw from this report is that the U.S. will be depending on retaining the kinds of jobs that are non-routine, ***project-oriented*** jobs performed by Knowledge Workers. These jobs will be the primary source of opportunity for U.S. workers to maintain a high standard of living in a global economy. Conversely, any job that can be made repeatable and routine will be outsourced overseas or replaced by a machine or both. The diagram below, provided in the study, summarizes this point.



The implication of this report's findings suggest the imperative that we adequately prepare and motivate our Knowledge Workers to take on occupations requiring innovation and creativity. However, innovation and creativity can only come from people who are trained and able to "execute" in project environments.

To a great extent this challenge must be accepted and met by our educational institutions and by our corporate employers. We must better prepare our workers in reading, writing, speaking, math, science, literature, history and the arts. Yet we must also find ways to better prepare workers to manage creativity and innovation. In addition, as Larry Bossidy advocates, we must instill a

"culture of execution" in our workforce and within our organizations http://www.proj-mgmt.us/Apprenticeship%20Article%20Final.pdf .

So, against this background we rightfully ask--are our traditional educational methods capable and on a track to take on this challenge of preparing today's Knowledge Workers? Or is there an imperative to retool our educational delivery methods to better accommodate these new, competitive needs of our workforce? The point of this document is that the 21st century apprenticeship approach as described within this standard provides a way to help many in the educational and training community in collaboration with employers meet these critical requirements.

We must acknowledge that being the advocate for change is never easy. The traditional academic method of instruction follows the long accepted tradition based upon the model set forth by the Greek masters. Our daring to challenge this approach will appear to some as heresy. But when we examine the traditional approach in detail , its shortcomings become apparent.

In its most fundamental form, the traditional approach consists of placing an authority figure in a classroom who lectures to a group of learners for a prescribed period of time on a topic deemed appropriate by academic administrators and by book publishers. Traditional instruction also typically includes capstone testing events (written or lab) that are administered within the classroom. The purpose of the testing is to ensure that the learner understands the material and can perform exercises that may or may not correlate to aspects of work on the job.

By design the traditional approach excludes actual on-the-job experiences for the learner. Consider the following statements:

> *"The first duty of a university is to teach wisdom not a trade; character, not technicalities.".---- Winston Churchill*

> *"The goal of education is understanding; the goal of training is performance." ----Frank Bell*

In both of these compelling statements we see an implied sense of separation and superiority of education over training, of knowing over doing, of philosophy over the specific details, of the classroom over the workplace, and of the theoretical over the practical. Yet, while wisdom, character and understanding are important to employers, they alone are not sufficient unless a performance dimension is added. Employers expect performance to result from a worker who claims to have an educational credential, and this expectation flows down to educational organizations to provide a complete educational experience within an actual work context.

The key point of this discussion, of course, is that a "doing" component in the actual work setting is required for the learner to go beyond abstract knowledge and translate that learning into productivity before the credential is awarded in full. It is also necessary to instill in the worker an orientation of achievement and execution. Consider these equally compelling statements supporting this point:

> *"One must learn by doing the thing. For though you think you know it, you have no certainty until you try." ---Sophocles*

> *"What I hear, I forget. What I see, I remember. What I do, I understand." ---Confucius*

> *"Anything that we have to learn to do, we learn by the actual doing of it" ---Aristotle*

> *"There are two modes of knowledge: through argument and through experience. Argument brings conclusions and compels us to concede them, but it does not cause*

certainty nor remove doubts that the mind may rest in truth, unless this is provided by experience"--- Roger Bacon

Within this context we begin to understand the problematic aspects for modern day education and training that is caused by the separation of instruction from the actual workplace. While we appreciate the richness of a classroom style experience, it can not replace the need for hands-on learning in an actual workplace setting. An academic credential that is awarded to a learner based only upon the exposure of classroom learning and testing from academic professionals risks being too theoretical and impractical.

Everyone realizes that a need exists for both off-the-job and on-the-job instructional approaches, yet we seldom see both utilized in a coordinated fashion outside of vocational education or other well established professions such as doctors, pilots, the trades etc. So one may rightfully ask: why have we allowed workforce development to bifurcate into groups of structured classroom delivery from a school followed by unstructured on-the-job delivery with an employer? The answer to these questions go beyond the scope of this document. But the result of the separation of the two is immensely relevant. The separation of classroom instruction from on-the-job training has enabled the creation of an educational industry that is quickly growing out of touch with the needs of employers. Worse yet we have developed a cadre of professional teachers who are preparing students for jobs which they themselves could not perform in a job setting.

The adoption of the OJEI[SM] standard enables educational institutions to bridge this gap more effectively by integrating the traditional classroom instructional model with an equally powerful on-the-job instructional component. Our primary focus is upon modern-day Knowledge Workers who are employed in both the private and public sectors and whose professional associations have not yet adopted apprenticeships or residencies. However, OJEI can be applied to any type of training.

The vision for this standard is that its application will help remove the chasm between the classroom and the workplace and raise standards in higher education. The standard helps the educational administrator or instructor integrate classroom instruction, on-the-job learning, skill validation, attitudinal motivation, productivity improvement and economic incentives into a cohesive instructional process. But perhaps most importantly the adoption of this standard forces the development of a population of instructors who really know what they are doing in both theory and practice.

1.3) Foundational Principles of OJEI[SM]

In competitive industries employers frequently invest in initiatives to improve their workforce productivity. Employers make such investments to secure competitive advantage. When these initiatives involve workforce education, employers turn to the educational and training community to deliver courses and workshops with the hope to provide workers with the knowledge and skills needed to attain productivity improvement targets. The question for the deliverer of the training then becomes: *what is the best way to deliver such courses and workshops to workers*?

We begin to answer this question by exploring the following identity:

Delivery of Training-→▲KSA →▲Productivity→▲Wages

Where the symbol ▲ refers to *a change in*, and the symbol → means *leads to*.

The identity shown above indicates that the delivery of training and education enhances (changes) a worker's set of Knowledge, Skills and Attitudes (KSAs). By design this change will lead to an improvement in (i.e. a change in) the worker's productivity which, in turn, will lead to an improvement in the worker's employment opportunities and wages. The process can be used iteratively throughout a worker's career.

An employer who invests in employee training or a student investing his own money to earn a credential expect to improve Knowledge, Skills and Attitudes on a target set of competencies that will lead to performance improvement on the job. The expectation on everyone's part is that exposure to the training/education should result in an increase in an individual's KSA's which leads to improvement in the person's productivity for his employer. This improvement in productivity, in turn, helps the employer realize greater profits and enables the individual worker to negotiate higher wages from the employer. In a perfect micro-economic framework, the employer can afford to pay the increased wage because the worker's productivity has increased. The underlying principles of these concepts come from both classical micro-economics and from learning theory.

In 1956 Benjamin Bloom and his associates www.olemiss.edu/depts/educ_school2/docs/stai_manual/manual8.htm identified that learning occurs across three independent (orthogonal) domains: cognitive affective and psychomotor. The Cognitive domain refers to mental skills (Knowledge). The Affective domain refers to feelings, emotion and attitude. The Psychomotor domain refers to manual or physical skills. In educational parlance these domains are known as KSA's (Knowledge, Skills and Attitudes). This framework has become a critical classification taxonomy that educators have relied upon for years to categorize both the type of instruction and the level of instruction.

Since its inception researchers have made refinements to Bloom's classification, but the fundamental ideas have remained in tact. In practice each domain can be thought of as a continuum ranging from the lowest level to the highest level through which the learner advances over time. For example, during the instructional process a learner might advance through the levels of both Cognitive (Knowledge), the Psychomotor (Skill) and Affective (Attitude) domains simultaneously as follows:

Level	Cognitive Domain	Level	Psychomotor Domain	Level	Affective Domain
1	Knowledge	1	Observation	1	Receiving
2	Comprehension	2	Imitation	2	Responding
3	Application	3	Practice	3	Accept & Adopt
4	Analysis	4	Achievement	4	Adapt
5	Synthesis	5	Excelling/Surpassing	5	Advocate & Exemplify
6	Evaluation	6	Creating/ Originating		

In 1965 Robert Gagne` www.e-learningguru.com/articles/art3_3.htm built upon Bloom's work and published his Nine Events of Instruction. According to Gagne` an effective instructor will put the learner through nine events when delivering new material in the classroom. These events are:

1. Gain attention of the learner
2. Inform learner of Objective.
3. Stimulate recall of prior knowledge.
4. Present the material.
5. Provide guidance for learning.
6. Elicit performance.
7. Provide feedback.
8. Assess performance.
9. Enhance retention and transfer.

The traditional academic approach has generally assumed that all nine of Gagne's steps occur off-the-job and typically in a classroom. The OJEI[SM] approach challenges that assumption. It builds upon Bloom and Gagne` by going beyond the cognitive domain and extending the instructional methodology into experience in the actual workplace.

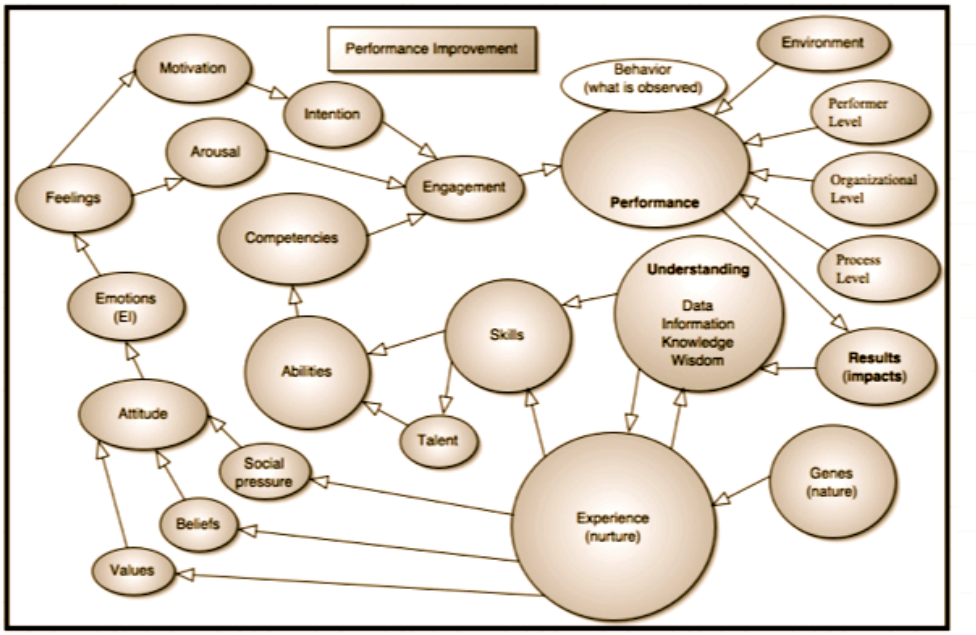
Because all three of Bloom's learning domains are well accepted within the educational and training community, one might assume that most modern-day instructional engagements automatically cover all three domains consistently. Experience shows otherwise. In practice, most educational/training programs and industry certifications rely exclusively upon imparting knowledge without including skill development and measurement on the job. Nor do they typically consider the development of an attitude of achievement by the learner. Consequently typical instructional approaches fail to touch the all important Psychomotor (Skill) or Affective (Attitudinal) domains because they disassociate the learner from the actual *performance of work* in a job setting. The OJEI[SM] method bridges these gaps by prescribing a method of instruction and validation that includes the best of both the traditional classroom model and the on-the-job model for a target set of competencies.

To show these relationships diagrammatically Don Clark has assembled a Performance Typology Mapping www.nwlink.com/~donclark/performance/performance_typology.html based upon his review of the literature on learning theory. Refer to his diagram shown below. A careful examination of the mapping suggests a sequential yet interdependent flow across the three learning domains and their causal impacts upon performance by the learner. The mapping also shows the pivotal effect experience on understanding, attitude, skills and ultimately performance.

In a competitive economy improved worker performance is the goal, and we can reduce the typology map to a simpler set of causal paths leading to that outcome. The first major path consists of knowledge, experience and skills that eventually drive performance via competencies. The second major path consists of the flow of knowledge, experience, attitudes, motivation and engagement which also drive performance. These causal flows define the full scope of a complete instructional cycle. Moreover, these flows suggest that instruction occurs as sequential steps that are complete only when the learner can affirm enhanced knowledge, experience, skill and motivation through the following statements:

> *"I have the knowledge to do my job"*
> *"I have the skills to do my job"*
> *"I have bridged the gap between theory and practice; I can successfully execute and apply those principles in a work setting.*
> *"I have the actual experience of doing my job successfully and have internalized the principles".*

Performance Typology Map



1.4 OJEI[SM] Integrates The Full Instructional Cycle

Figure 1 and Figure 2 on the following page illustrate graphically how the OJEI[SM] method works across the cognitive and psychomotor domains. OJEI helps educational providers shift their focus from a strictly cognitive-based delivery to a more balanced (cognitive and psychomotor) that includes experience on-the-job. OJEI calls for the instructor (or multiple instructors working in tandem) to deliver classroom and on-the-job instruction for a target set of competencies. Figures 1 and 2 suggest that by adopting the OJEI method the vector shifts across both the Cognitive (knowledge) and Psychomotor (skill) domains. This rotates the instructional vector counterclockwise away from a cognitive-only, classroom-only mode to one that includes an on-the-job component and psychomotor effects.

For any given set of target competencies the OJEI method provides a set of instructional benchmarks and a tracking mechanism that guides an instructor through the delivery of both classroom and on-the job instruction in an efficient manner. Thus, it enables the seamless integration of both classroom instruction and on-the-job training for any course or workshop. Refer to Figure 4 below. This standard describes the steps necessary to achieve these benchmarks in the most efficient possible manner.

This OJEI method is designed for courses and workshops that require the right blend of classroom instruction and on-the-job training. The method enables the instructor to synchronize his/her instruction to the learner's developmental stages enabling easy tracking and measurement of skill and knowledge growth. In short, it brings the possibility of apprenticeship to every educational opportunity.

In addition, the OJEI method touches the affective domain by borrowing two key concepts from apprenticeship. First, OJEI calls for the instructional process to include economic motivation for the worker throughout the training and development process. Economic motivators can include a variety of instruments available to employers--the promise of increased wages being one. Secondly, the OJEI method is a mentoring-based approach in which a coach instils acceptance , adoption, adaptation and internalization. The coaching and socialization lead to acceptance of an

“execution orientation” resulting in greater buy-in to the need for achievement and motivation by the worker which leads to greater productivity. There is also enough flexibility within OJEI to allow groups of workers to operate cooperatively to coach themselves.

OJEI[SM] ensures relevance and a faster and more efficient transfer of knowledge, skill and affective development that leads to productivity improvement by the worker. It also is cost effective compared to residency models and unions that require significant volume and economies of scale which serve as barriers to entry for apprenticeship. In this regard the OJEI method helps ensure that the training and education delivered to the learner translate directly to the performance that industry needs and expects *in the shortest possible time*. It is the generation of productivity improvement that closes the loop of worker motivation by inducing the worker to earn higher wages and obtain an improved standard of living due to the improved business results that he has generated for his employer. Refer to Figure 3.

During the times of the great educational masters such as Bloom and Gagne` the working world was less complex and less competitive. Jobs could be broken down readily into discrete, logical components, and the instruction provided in the classroom could be logically separated from the learning that occurred on-the-job. Today, however, the complexities and ambiguities brought about by technological advancements, and global competition have changed the equation for Knowledge Workers. It is essential that we develop and implement instructional methods that break through the classroom tradition and build upon new platforms that combine the classroom and the workplace. The OJEI method is a step in that direction.

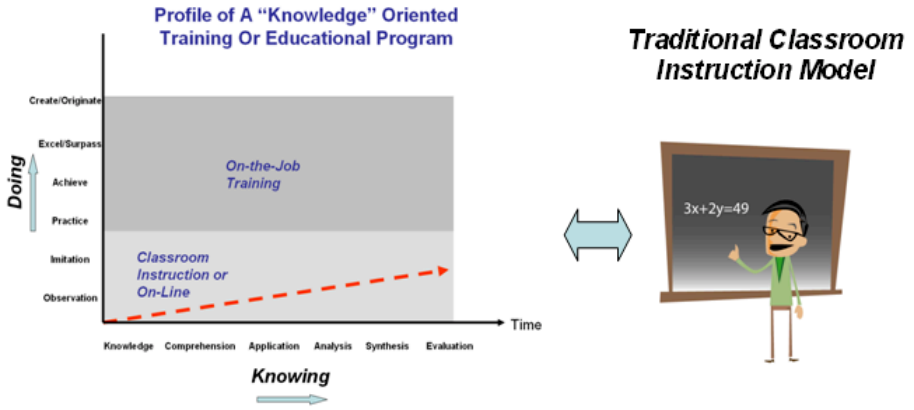


Figure 1: Profile of a program focusing on Knowing only

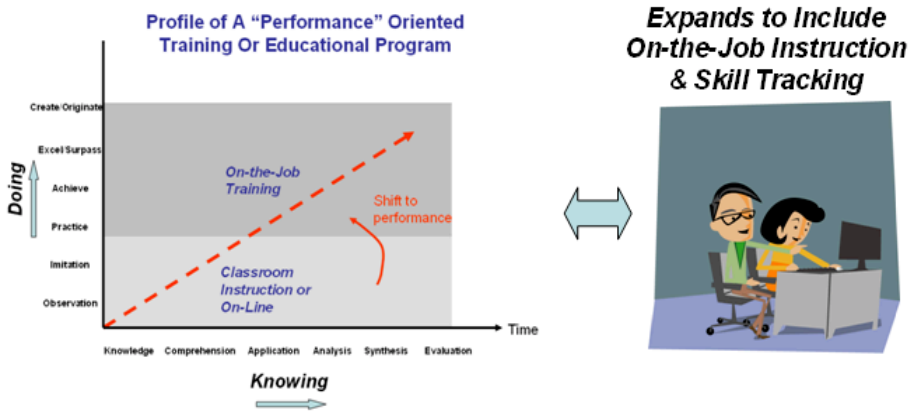


Figure 2: Profile of an OJEI balanced program focusing on both Knowing and Doing with Skill Validation and Skill Tracking

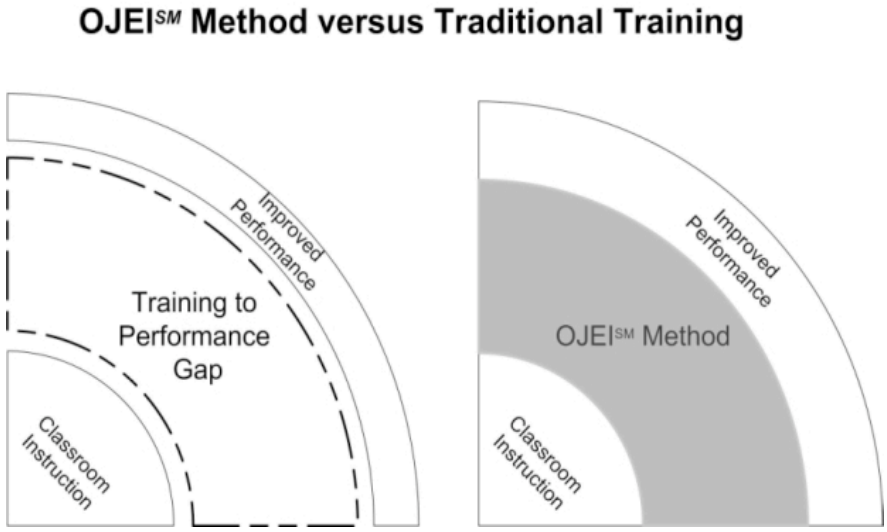


Figure 3

The Linkage of OJEI Benchmarks To a Learner 's Psychomotor Progress On a Target Competency k

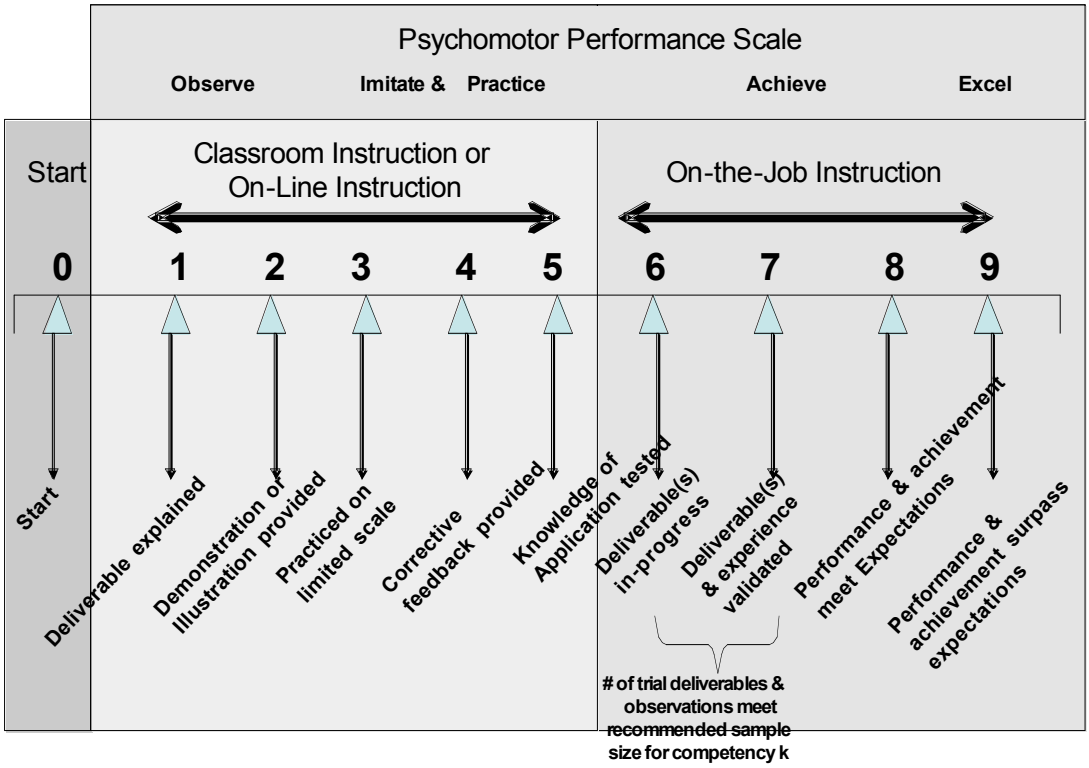


Figure 4 OJEI[SM] is an Instructional Method that Optimizes Productivity by Seamlessly Combining Classroom Instruction and On-the-Job Instruction

Having established the connection between the delivery of training to improving KSA's and productivity, we can now describe the connection between productivity and wages. For training to be effective a worker must be motivated and expect that the learning will result in economic benefit to him. To explain this we borrow from Adam Smith and the classical economists who followed in his footsteps.

Employers pay each worker according to his value, and a worker's value is tied to the ratio of his productivity and wages. Based upon standard economic principles, profit maximizing companies operating in competitive markets will consider productivity into their hiring decisions and in their wage/salary administration. We describe this principle using standard economic terms for any employer as follows:

Π = Profits= Revenues – Costs

Π = P*(Q (L, K)) – w*L-c*K

Where,

Π equals profits for company X –

P equals the price of company X's goods or services

-Q(L, K) is the production function for company X based upon inputs of Labor (L) and Capital (K)

-w is the wage rate for labor

-c is the cost of capital

By maximizing profits (**∂Π/∂L=0)** with respect to Labor (L), and by setting the price (P) equal to 1 (for the sake of discussion), the employer will hire the number of workers to the point that the marginal product of labor $\mathbf{Q'_L}$ (i.e. the productivity of labor) equals the wage rate **w** or,

$$\mathbf{Q'_L = w}$$

Moreover, employers will be able to increase wages to the point where the wages equal the value of productivity improvements subject to the going market wage rates for the particular occupation. In other words, a profit maximizing firm bases its hiring decisions and wage rates on the expected value (i.e. productivity/wage) of workers as well as on the going market rate for the particular occupation in question. It should be noted also that wage increases are not automatic. They are typically negotiated between the worker and the employer.

Using the above analysis, we consider learners to be economic agents just as we do employers. For a training process to effectively motivate a worker to learn new skills, there needs to be economic incentive. If the learning results in productivity improvement for the employer, then the employer can afford to pay the worker more. So, a fundamental premise of the OJEI[SM] method is that the educational system support the linkages between employers and learners to jointly execute the full cycle of:

Knowledge→Skill→Productivity→Wages for developing the workforce.

When executed in a rational manner schools, employers and workers, acting out of mutual self interest, will work together to comply with the OJEI instructional criteria. In doing this, they optimize the training process in a cost effective way. A role for the educational institution is to serve as the facilitator to make this happen.

2.1) Overview of the OJEI[SM] Steps of Instruction

The OJEI[SM] method of delivering instruction contains 14 steps (macro-steps) divided into four discrete stages. The method contains two tracks of work: the learner development track and the business outcomes track. Refer to Figure 5 below. When following the OJEI method an instructor ensures that his/her delivery follows all of the steps and contains both tracks of work. It is not necessary for the instructor to discard or replace his existing classroom approach. Rather, OJEI steps are additive to the instructor's existing approach and build upon an already established classroom delivery styles.

Stage 1 is the preparation stage and includes step 101; stage 2 is the classroom instruction stage and includes steps 102 through 108; stage 3 is the on-the-job instruction stage and includes steps 109 through 113; and stage 4 is the committee review stage including step 114. Every course or workshop that uses OJEI will follow the four stages and all 14 Macro steps. Also, the instruction will contain both tracks of work (i.e. the learner development track and the business outcomes track) to ensure that both learning and targeted business outcomes occur. An important premise of OJEI is that adequate competency development on the part of the learner can not

occur unless simultaneously the worker is producing targeted business outcomes on the job. In addition, the learner must go through the training process with the expectation that his acquisition of new knowledge and skill will result in productivity for his employer which enables the employer to pay higher wages.

Figure 6 illustrates a summarized flow diagram of the 14 Macro steps required for the delivery of on-the-job enabled instruction. The method begins with the educational institution collaborating with the employer to prepare instructional objectives, to tailor course materials and to clarify incentives for the learner at step 101. Step 101 occurs in Stage 1 as illustrated in Figure 5.

The OJEI[SM] Method Contains Fourteen Macro Steps of Instruction Within Four Stages across Two "Tracks" of Work.

Tracks:	Stage 1 Preparation Macro Step 101	Stage 2 Class Room Instruction Macro Steps 102-108	Stage 3 On the job instruction Macro Steps 108-113	Stage 4 Award Credential/Wages Macro Step 114
Student-Worker Development Track	Identify Targeted Competencies	Observation, Imitation and Practice	Achieving, Excelling, Surpassing	Receive Credential and Progressive wages
Business Outcomes Track	Identify Targeted Business & Productivity Outcomes. Establish Incentives	Make the instruction contextualized and reinforcing to the targeted business objectives and actual business projects	Measure the student-worker's actual performance against targeted business and productivity requirements	Award the credential and wages based upon demonstrated skill, knowledge, productivity and business outcomes

Figure 5

Throughout each of the steps 102 through 114 the instructor repeatedly goes through a sequence of four activities that form an iterative instructional loop of micro-steps for all deliverables and target competencies in scope. These four step micro-loops (which are embedded in the Macro steps) may be referred to as 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. The idea here is that to be effective the instructor must address each target competency and provide repetition/practice for the learner throughout the entire learning period-- both in the classroom and on the job. The Micro loop is a set of instructional steps that embody the methods of Job Instruction Training.

By using an instructional micro-loop the instructor reinforces an "execution" orientation to the learner during classroom instruction, lab assignments as well as during each on-the-job training encounter with a learner. During the first step of the loop, Explain & Demonstrate, the instructor explains/demonstrates concepts for the system as a whole as well as for the deliverable in question. In the second step Let the Learner Do, the instructor gives the learner the time and the opportunity to adopt and apply the concepts to real world deliverable(s) and situations. In the third step, Assess the Quality of the Deliverable, the instructor reviews and assesses the readiness and quality of the deliverable(s) being produced by the learner at a point in time. In the fourth step, Provide Guidance & Correction, the instructor provides directive feedback to help the learner correct errors and counsels the learner to resolve contextual problems and obstacles that are encountered.

This instructional looping is an instructional method based upon Job Instruction Training. Looping is repeated throughout the 14 step method until all of the target competencies are covered and until the business and productivity outcomes are attained. The loop becomes particularly

important as a component of on-the-job instruction. When combined with the measurement of actual business outcomes, the repeated instructional loops become very effective in helping workers achieve proficiency in job tasks.

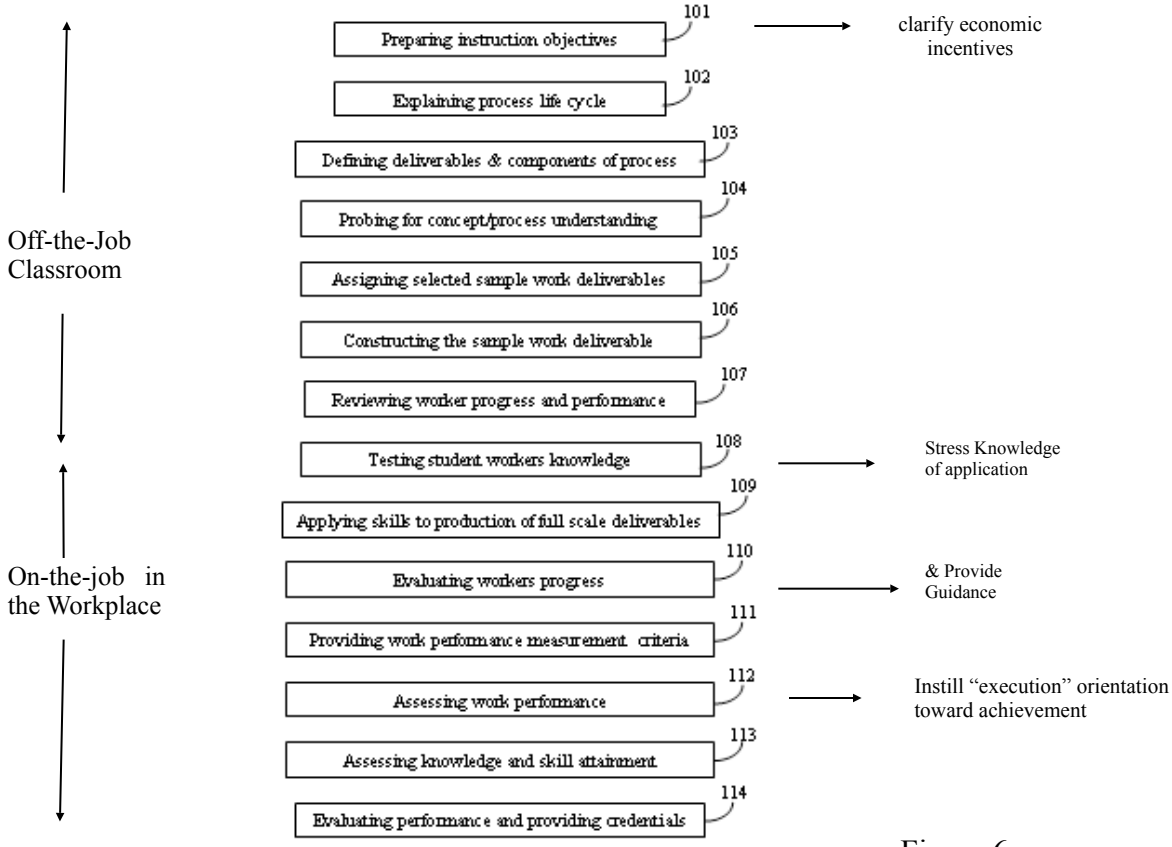


Figure 6

3.1) Assessing Educational/ and Training Program Compliance with the OJEI[SM] Method

The steps of OJEI[SM] method are defined below in detail and in the attached supplement. In the supplement Assessment tables are provided to help the instructor (or training administrator) judge and score the degree of compliance of his/her program with the OJEI method. Following the assessment and scoring process, the instructor can implement remediation that will bring his program into greater compliance with this standard.

For some training and educational organizations immediate compliance to this standard may not be possible or desirable. These organizations may find, however, that the process of *working toward* compliance to this standard will yield substantial improvements in the effectiveness of their programs. Therefore, registration is the first step allowing both the educational provider and employer to assess performance, identify deficiencies and organize resources to remediate them. The second step, compliance, is awarded once the provider remediates its deficiencies and receives final validation.

3.2) Stage 1-Step 101-Preparation

Preparation is a step performed jointly by the instructor (or a program administrator of the educational institution) in collaboration with the employer prior to the delivery of classroom instruction. Preparation includes meeting with the employer organization to identify business objectives, target competencies, worker productivity improvement targets and worker incentives

(such as progressive wages) set by the employer. During this step the instructor should come to thoroughly understand the client-specific competencies (if any) or industry competencies and learning objectives that are within the scope of scheduled training events. During the interview with the employer the instructor should ask probing questions to understand the nature of the organization's business as well as its business processes, its deliverables and any project life cycles for its Knowledge Workers. The instructor should evaluate the organizational culture, look for obstacles, and probe for company-specific approaches and requirements that would be used to contextualize the delivery of training.

During this phase the instructor should assess the commitment by the employer to use a competency model of instruction as well as to secure commitment from all parties (employer, other instructors and learners) to participate in the on-the-job training component.

To the extent that budget allows, the instructor should tailor the instructional materials to fit the client organization and to enable contextualized instruction/learning during the instruction. This would include the incorporation of client-specific templates and terminology into the instructional materials if available.

3.3) Stage 2-Step 102- Explaining the Process Life Cycle

Having completed the preparation steps classroom Instruction (or instructor led training) now begins with this step.

The OJEI[SM] standard helps instructors augment their existing classroom deliveries to Knowledge Workers. These workers typically work within business processes that are executed during relatively lengthy project life cycles or in business processes. To accommodate these kinds of workers the instructor should take the time to explain the big picture first by describing the flow of the life cycle or process, indicate how the learner's job relates to the production of deliverables (work products) and explain the various states of readiness and quality expectations throughout the life cycle. Further, the instructor describes the business expectations for meeting defined requirements, schedule, cost and quality targets.

The instructor starts by explaining/showing the big picture from a theoretical or conceptual point of view so that the learners understand the overall flow of their work, the intermediate deliverables and steps, the interactions of work components, responsibility assignments and business requirements. Doing all of this paints a picture of the overall vision for work flow and provides context for the observing student.

It is also appropriate during this step that the repetition of the instructor's explanations be delivered in a manner that is like peeling an onion ---one layer at a time. The instructor starts by imparting knowledge of the operation or deliverable at a general and then explaining the concept more specifically and in more detail.

By seeing the big picture at first the learner will more readily come to understand the operation of the various sub-components. However, to the extent possible and time permitting during this macro step of instruction, the instructor provides hands-on exercises as part of an instructional loop of micro-steps for the "big picture flow" covered within this step. These activities are Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. Consequently assigning a real world, hands on exercise that enables the learners to experience the "big picture" is appropriate with this macro step.

3.4) Stage 2-Step 103- Defining Deliverables and Components of the Process

Classroom Instruction (or instructor led training) continues during this step.

After presenting the big picture the instructor then addresses in depth the theory and operation of each specific deliverable (intermediate work products, artifacts, objects or states of readiness) of the overall system or business process of relevance to the learner. Examples of such deliverables would be a project plan to a project manager or a software program to a software engineer.

During this step the instructor identifies detailed steps necessary to produce intermediate work products or intermediate states of readiness that are required by the learner to signify that tangible progress is being made for each deliverable throughout the project life cycle or throughout the business process. Through explanation the instructor provides a mental connection for the learner between the deliverables and operational steps needed to "mature" the deliverable and the target competencies identified during the preparation step.

This step should address and answer specifically the basic who, what, where, when, how and why questions related to the application of the step or production of the detailed deliverable involved in a work process at different times during the life cycle. In addition, the explanation should be sequenced to cover each competency, one at a time or bundles of competencies tied to a single deliverable.

Also, in this step the instructor should explain and demonstrate how the operation is to occur on the job or show what the deliverables should look like when constructed correctly. The instructor should articulate the specific business performance expectations for each deliverable and/or step.

The instructor must take care to provide contextualization by showing the possible choices and variations of format, scale or configurations of the deliverable that are appropriate to meet the client organization's specific requirements at different points of the life cycle.

A key component of the OJEI[SM] method is the *deliverables orientation*. Figure 7 exemplifies and illustrates how this would work when instructing a project manager and/or an IT applications developer to do their jobs. Both workers might perform their work while following the same project life cycle (as shown) consisting of four phases: Initiation, Planning, Execution, Closeout. In this simplified example the project manager is responsible for producing three deliverables: a project plan, project tracking/control documents and providing leadership behaviors. As shown we assume that the applications developer is responsible for producing a configured application, data and reports.

The OJEI method provides the framework whereby the instructor helps the learner develop the required skill and knowledge by delivering classroom instruction followed by on-the-job instruction during an actual project life cycle. During the delivery of the training the instructor focuses the instruction by explaining and demonstrating the steps needed to complete the intermediate deliverables on time, within budget and with the appropriate quality. Graphically in Figure 7 we show small triangles on a time line to depict the intermediate deliverables and states of readiness.

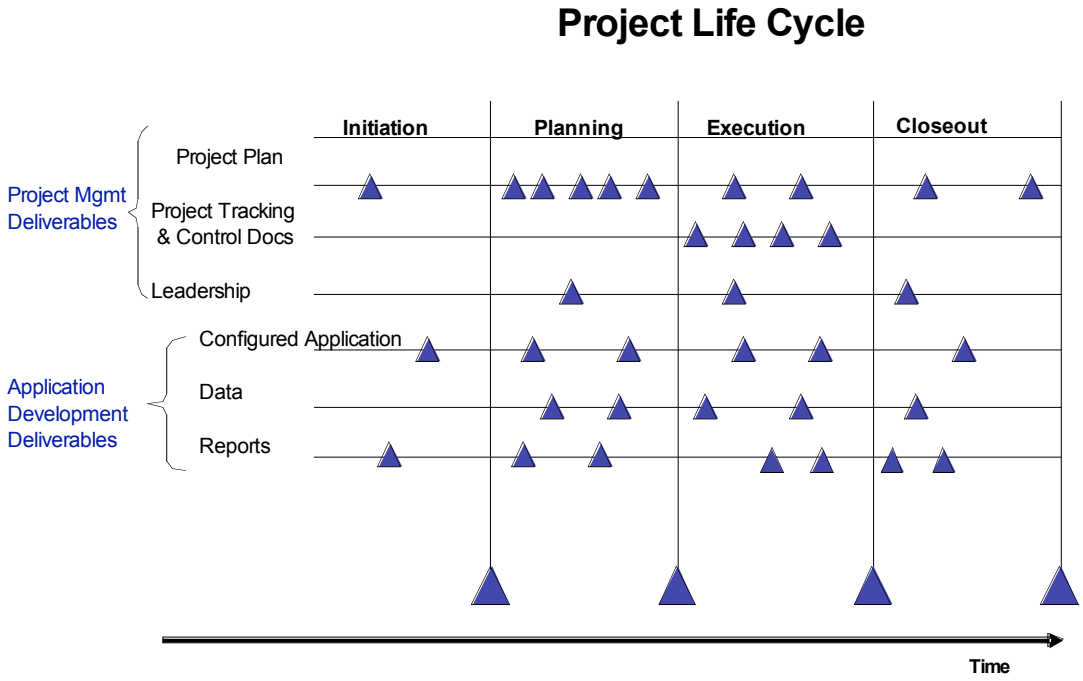


FIGURE 7

It is common in competency-based training programs for an instructor to start the instruction with a list of target competencies, to which the learner must eventually become proficient. By following the OJEI method these competencies are organized by deliverable which enables a more straight forward instructional delivery. By explaining and demonstrating the components/steps required to construct each deliverable and by sequencing the discussion so that it logically follows the project life cycle (i.e. the big picture), the instructor conveys the training content in simple and understandable segments which follow a logical sequence and that tell a story for the learner.

On the other hand, if the instructor orients the discussion around raw competencies instead of sequenced deliverables, the instruction comes across as being disjointed, and it takes a longer period of time for the learner to understand the content.

By organizing both the classroom instruction and on-the-job instruction around deliverables and their component steps, the instructor enhances the contextualization of the training and shortens the learning cycle. In addition the use of the deliverables orientation makes the on-the-job instruction more fruitful and productive. For a more complete explanation of this approach the reader is referred to Appendix 1 of this document.

3.5) Stage 2-Step 104- Probing for Concept/Process Understanding

Classroom Instruction (i.e. instructor led training) continues during this step.

For each topic, deliverable, objective, or competency that the instructor explains, the instructor should pause before moving on and ask the learners questions that probe for their understanding. Questions such as the following are appropriate:

- Do you understand?
- Can you repeat the main point?
- How are you doing this step currently in the workplace?
- Is this currently working for you?
- What problems or issues are you currently seeing that prevent you from doing this correctly?
- What format variations are appropriate for your workplace?

The instructor should expect the learners' responses to duplicate and imitate his own explanation. This probing and discussion allows the instructor to uncover a lack of understanding and to address the specific concerns of each learner in the classroom setting. It also enables the participants to learn from each other. For any deliverable or competency in which the learners show a lack of understanding, the instructor should repeat the instructional micro loop including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. This may include hands-on exercises for the learners to practice on either individually or in teams.

3.6) Stage 2-Steps 105-107 Apply Skills and Knowledge to a Current Project

Classroom Instruction (or instructor led training) continues during this step.

The goal of steps 105-107 is to direct the learner to actually apply/practice a skill in a lab or workshop for each target competency using deliverables from real work projects. The role of the instructor is to give the assignments and to review, evaluate, and give guidance and corrective feedback to the student during these practice periods. The idea here is that a little bit of in-class application, evaluation and feedback can go a long way in enabling the worker to transition from knowledge development to skill development.

Generally, class time is limited, so the instructor should pick small scale assignments that allow the learner to consolidate a number of concepts at once while honing his/her skill and demonstrating competency to perform the tasks necessary to create the appropriate points of readiness. Also, because of limited available time in the classroom, the learner should try to complete: 1) small scale deliverables, 2) work that is a microcosm of the full scale deliverable or 3) intermediate work products that will actually be produced on the job.

Specifically for step 105**, Assign Selected Sample Work Deliverables,** the instructor makes assignments for the learners to select sample work deliverables that are connected to their own real world, on-the-job situation. The chosen work should be of a limited or partial scale, of limited scope and of low complexity because of the scarcity of available classroom time. Yet, the assignment must also be connected to real work products or operations that are from the actual work place. Hypothetical exercises or cases are not acceptable under the OJEI^{SM} method.

For Step 106, **Construct Sample Work Deliverable**, during the allotted time in the classroom or lab the learners successfully perform and practice the steps necessary to construct the sample deliverables and work products and to apply their knowledge throughout the various stages of deliverable maturation through the worker's project life cycle.

For Step 107, **Review Worker Progress and Performance**, while the learners are performing and practicing in step 106 in the classroom, the instructor visits with each learner to review and

evaluate his/her progress, answer questions, make suggestions and correct errors. Because the learner is working on a real world project deliverable or operation, the instructor must assess and answer the student's questions in real time based upon the specific context of the situation and the organization. The instructor also provides guidance to help the learner overcome anticipated real world, contextual problems/obstacles that the learner raises. For any deliverable or competency in which the learners show or the instructor anticipates a lack of understanding, the instructor should provide iterations of instructional micro loops including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. These steps are defined in Figure 8 below and explained in more depth in Appendix 1.

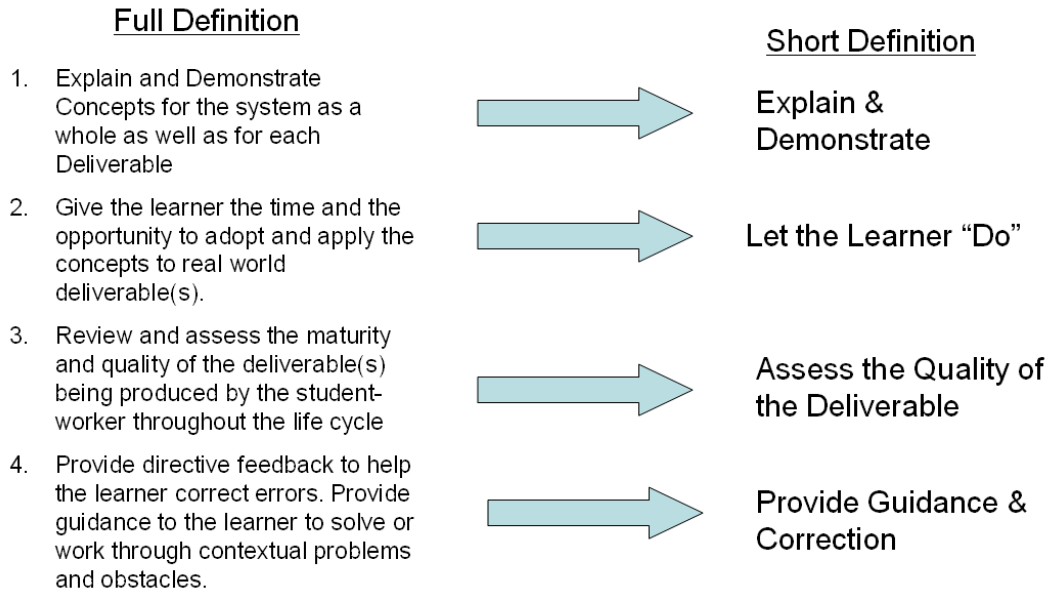


Figure 8: Definitions of Instructional Steps of the "Micro Loop" that is Used Both in the Classroom (or lab) and On-the-Job For Each Deliverable and Competency Covered

While visiting with participants the instructor reinforces the priority of meeting business performance requirements that address quality, schedule, cost and completeness. The instructor should also let learners interact and share ideas.

3.7) Stage 2-Step 108 Testing Learner's Knowledge of Application

Classroom Instruction (or instructor led training) continues during this step.

Before closing out the classroom instruction steps, the instructor administers a written or verbal examination to the learners. The examination is to application-oriented using case studies and vignette style situational questions (at least one question for each target competency) that cause the learner to use judgment and solve application-oriented problems. Also, it is permissible to let groups work on the exam in teams together.

The instructor should construct the test questions based upon his own experiences (or others experiences) as a practitioner. The instructor can simplify the test construction by orienting the exam toward project deliverables. Each project deliverable may tie to multiple competencies which reduces the need to provide a separate test question for each competency.

Following the administration of the exam the instructor reviews the test with participants explaining the correct answers, answering questions from the learners and giving suggestions and tips for on-the-job application.

For any deliverable or competency in which the learners show a lack of understanding, the instructor should provide iterations of the instructional micro loop including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. These steps are described in detail in Appendix 1.

3.8) Stage 3----Steps 109-110-On-the-Job Instruction

On-the-Job Instruction begins during Stage 3. Now that the classroom instruction has completed, the delivery of instruction must now be performed on the job for each target competency. Under the OJEI[SM] method the instructor visits and meets periodically and routinely with the learners while they are completing their actual deliverables in the workplace throughout the project life cycle.

It is possible and allowable that the classroom instructor and on-the-job instructor may be different people or multiple people. For instance, the classroom instructor may be a professor, whereas the on-the-job instructor may be the learner's supervisor or an experienced colleague acting as a coach.

Step 109 requires the learner (or his/her employer) to select a relevant project or operation to work on. During step 109, **Applying Skills to Full Scale Deliverable(s),** the learner is now assigned the responsibility to apply the skills and knowledge to the production of full scale deliverables in the actual on-the-job setting for the duration of one or more projects. This becomes a fully contextualized learning experience. The worker continues this step until all target competencies have been practiced on the deliverables and a satisfactory state of completeness and readiness have been achieved in the eyes of the on-the-job instructor.

The worker and the instructor must set aside time routinely for the learner to spend meeting with the instructor for the delivery of the on-the-job component of the training. Because the project life cycle can be rather long, the meetings will occur over an extended period and until knowledge/ skill attainment has occurred and business performance has been demonstrated.

For step 110, **Evaluating Worker's Progress,** while the learner is working on the completion of the full scale deliverables on the job, the instructor meets periodically and routinely with the learner to:

- review and assess progress on the learner's deliverables and work products
- provide suggestions as to how to make the theory work on the job,
- provide guidance as to the selection and choice of the various options and configurations that will likely work best for the learner
- Provide correction as needed on steps that were not fully understood during the classroom instruction.

Both during and between these routine meetings (which are nominally 30 minutes in duration) the instructor, as appropriate, provides an iteration of the instructional micro loop including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. The *"30 day Deliverable Lookahead form for On-the-Job Instruction"* on pages 34 and 35 are useful tools to make the instructional micro loops operational.

The execution of the on-the-job instructional micro loops is, at first, much like a physician guiding a patient. The instructor (similar to a physician) tries to create awareness and makes kindly suggestions to the learner (similar to the patient) as to which activities are likely to be forthcoming over the next 30 days or so. The instructor also provides direction and gives the learner recommendations such as "tips and tricks" and raises awareness of risks and mitigation strategies. The instructor also attempts to gain acceptance and personal buy-in to these

recommendations from the learner. Using a form in a manner much like filling out a prescription pad that a physician might use, the instructor completes the *"30 day Deliverable Form"* to document recommendations/expectations and gives them to the learner for later reference. This form is shown on page 34.

Following each meeting with the instructor, the learner goes off to work independently and implement (i.e. **"Do"**) the instructor's suggestions on the job. This step of working independently allows the worker to develop from an affective standpoint. After approximately two weeks or so of working independently the learner meets again with the instructor-coach to review the results re-enter the micro cycle of instructional steps. As a part of the micro loop steps, the instructor inspects the tangible work products (i.e. the deliverable) to assess and ask questions of the learner. Based upon this assessment the instructor provides additional guidance and correction which will continue over time until the student worker delivers the right result and provides evidence of proficiency. Then the instructor and student worker will re-start the micro loop with the next up-in-coming deliverable. Again, it should be emphasized that the *"30 day Look-ahead Deliverable Form"* is a very useful tool to structure the execution of each micro loop during the on-the-job portion of the training. Refer to Figure 9 below for further clarification.

As the project progresses through the life cycle and the learner gains experience and confidence, the routine meetings between the learners and the instructor become less directive in that the instructor begins to play a more collegial role helping the learner resolve higher level issues that require more judgment. Also, the learner begins to take a more independent role in preparing for the development of deliverables.

The on-the-job meetings between the instructor and learner continue throughout the entire project life cycle and/or until the learner successfully completes the target deliverables and demonstrates adequate skill and knowledge for each of the steps that cover the target competencies. The relatively short durations of roughly 30 minutes per meeting prevent the process from having significant adverse impacts on worker productivity. The reader should refer to Appendix 1 for a more detailed description of this process.

It is essential that on the on-the-job instruction occur over an adequate period of time so that the student can demonstrate achievement and obtain proficiency through repetition over a variety of work situations. This includes repeated explanations and demonstrations on the part of the instructor as well as repeated practice by the learner in producing the required deliverables independently. To help structure this repetition the OJEI^{SM} method calls for the use of a *Recommended Sample Size and Cross Reference Matrix* that indicates the suggested number of repetitions (i.e. trial observations) for the student to practice producing the target deliverable(s) as well as to demonstrate proficiency of the underlying competencies over a variety of situations. This gives the instructor guidance as to when sufficiency of practice should be achieved. Figure 10 below illustrates the matrix in partial form using a project management example.

During the on-the-job meetings the instructor focuses upon giving guidance to the learner to produce his/her high level deliverables as shown across Figure 10. By using the *"30 day Look-ahead Deliverable Form"* the instructor provides structure allowing the learner to worker independently. The competency mapping to the deliverables (Figure 9) ensures that the worker is practicing his skills on the targeted competencies which enable the instructor to provide competency validation once the appropriate number of trials have been attained on the part of the learner.

OJEI also provides a structured coaching template for instructors to address the affective domain that goes through classroom instruction and continues through on-the-job training for each target competency. The classroom instructor and OJT coach take the learner through a development process: Receiving--->Responding--->Accepting/Adopting--->Adapting--->Internalizing. The coaching form on page 35 describes this using Job Instruction Training.

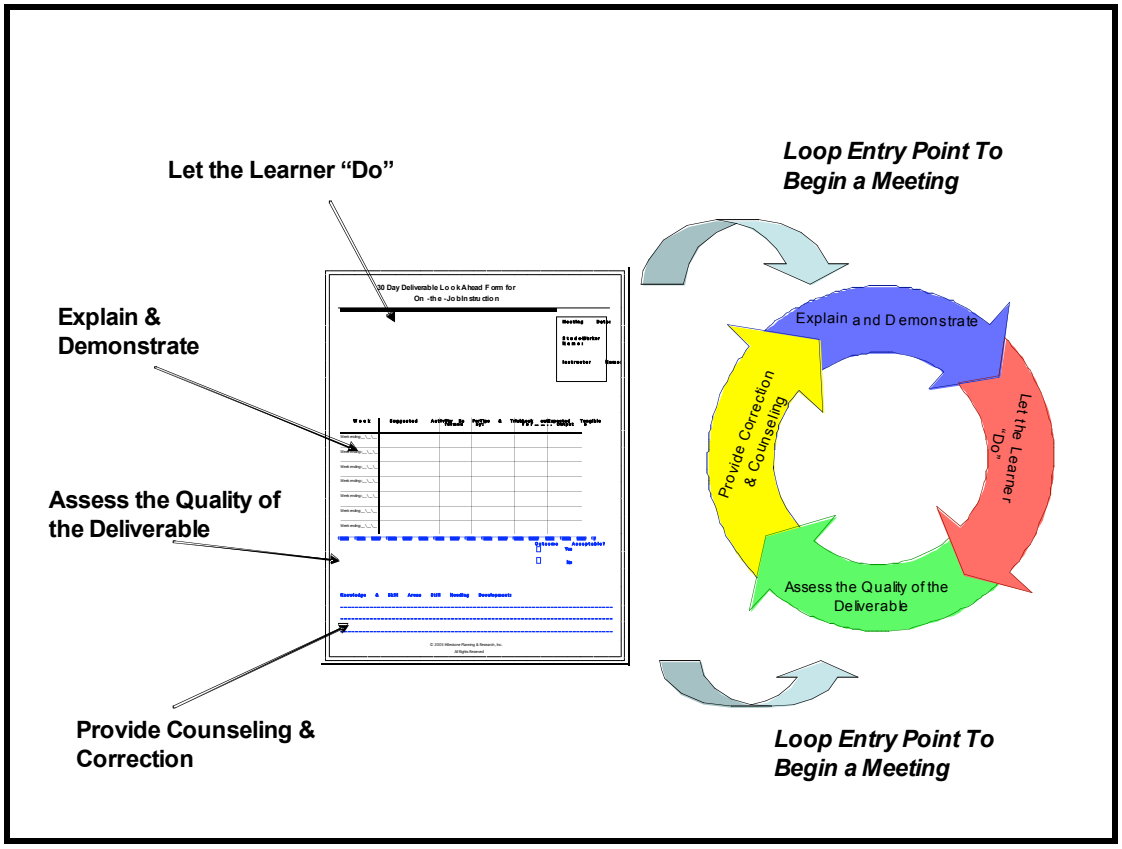


FIGURE 9—Using the *"30 day Deliverable Look-ahead Form"* to Structure OJT Meetings that Follow Iterations of the Instructional Micro Loop. Note: A Meeting Can Begin at Either of Two Points in the Loop as Shown.

			High Level Project Management Deliverables											
Item Number	Competencies	Initiate the project correctly with a Business Case and/or a Project Charter	Identify Detailed Target Outputs, Requirements and Outcomes (scope)	Create a Project Plan and secure needed resources	Update the Project Plan Routinely	Provide team motivation through effective leadership	Establish/Maintain Team Connectivity & Communications	Provide Stakeholder Updates on a Routine Basis that include Appropriate Performance metrics	Achieve Project Milestones on Schedule	Achieve Project Cost Objectives	Manage Project Risks	Routinely Ensure that Stakeholder Expectations are Aligned with Project Realities and Risks	Totals
PM3.1.1	Identify stakeholders, their objectives and gain their approval for the scope of work	1											1
PM3.1.2	Write a high level scope of work including justification, product description, major deliverables, success criteria, high-level time and cost estimates, assumptions, and constraints	1											1
PM3.1.3	Refine business, functional and technical requirements with project stakeholders		1	1	3							4	9

FIGURE 10 Recommended Sample Size and Cross Reference Matrix--- Partial View---numbers reflect target repetitions of deliverables that map to target competencies.

3.9) Stage 3----Steps 111-113: Productivity, Learning and Economic Outcomes Measurement

Step 111 can conceivably occur at any point following step 101 of the 14 step process. Steps 112 through 113 occur concurrently with steps 109 and 110.

During step 111, **Providing Work Performance Measurement Criteria,** the instructor and company management set up measures of:

- work performance information work that gauges the productivity improvement over time of the learner or groups of learners on the job (control chart recommended)
- Progress being made by the learner or groups of learners in terms of knowledge and skill attainment on the target competencies.
- The administration of progressive wages or other economic incentives that correlate to the productivity improvements achieved by the worker.

Work performance criteria should contain productivity and output measures such as the average number of the worker's deliverables that are meeting (or have met) quality, schedule, cost and scope targets over a reporting period. Figure 11 illustrates an example of implementing work performance measures (which is also part of step 112) by using an X-bar and R-chart plotting the overall performance and variation of a subset of projects under a worker's responsibility. Here work performance measurement is tied to average overall project performance for those projects under the learner's responsibility. Under the OJEI[SM] method the effectiveness of on-the-job learning is a function of job performance measurement.

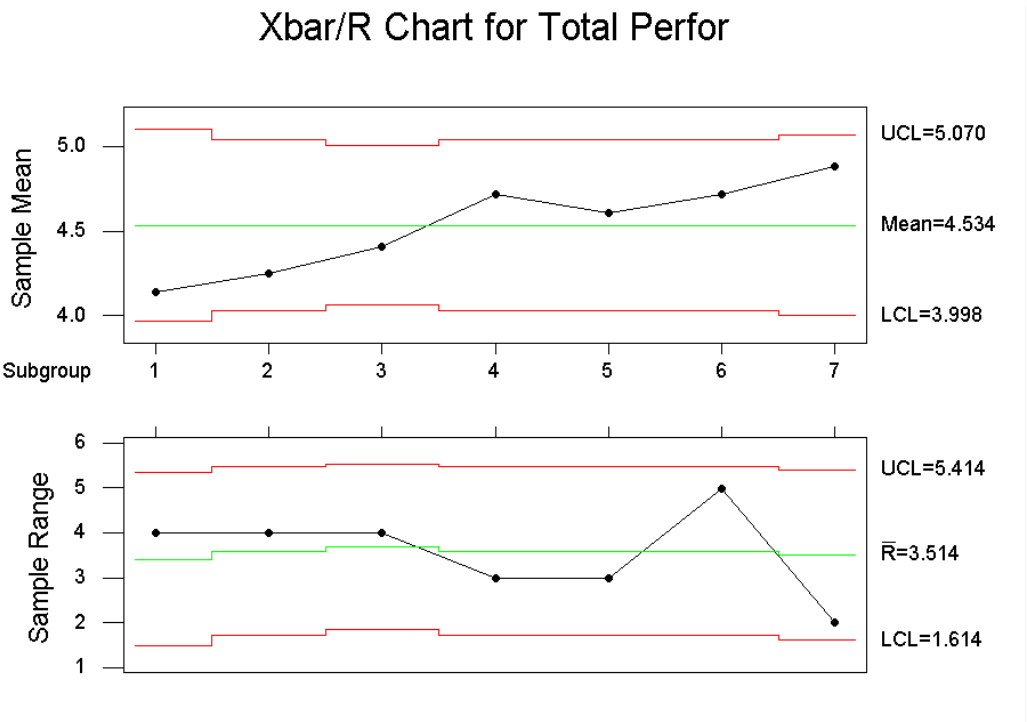


Figure 11: Sample X-Bar and R Control Chart Measuring Average Learner Performance (top) and Variation (bottom) Across All Learners' Projects for Each of Seven Reporting Periods

Having established the performance criteria evaluation in step 111, the instructional method moves to step 112, **Assessing work performance.** In this step the instructor meets periodically (in collaboration with company management) to assess and record work performance information during step 112 that gauges the productivity improvement over time of the learner (or group of learners) on the job. Use of a control chart (Figure 11) or a similar tool is recommended.

It is expected that the training will impact job performance in a positive way and the measurement of actual work performance facilitates the learning process and administration of progressive wages. In addition, the instructor seeks to instill, socialize and continually reinforce the values that underlie the specific competencies and to help the learner internalize these values as a part of the motivational component of the training. in particular, the instructor reinforces an “execution orientation” that results in greater productivity.

During this step the instructor should observe improved performance metrics pointing to productivity improvement. As an example the top part of the control chart in Figure 11 shows the example of a general trend of average business performance improvement which is the desired direction. The delivery of on-the-job instruction should occur until the learners achieve or excel in performance on each critical business performance indicator. During this time as proficiency of the competencies are demonstrated by the worker and productivity improves for the employer, it is assumed that economic incentives (such as progressive wages) will be provided to induce the the worker to achieve greater productivity.

During step 113, **Assessing Knowledge and Skill Attainment,** the instructor continues to meet routinely with the learner to periodically assess, validate and record progress being made by the worker in terms of knowledge and skill attainment on each of the target competencies and/or deliverables throughout the project life cycle. Validation of performance on each target competency can be recorded using a psychomotor scale such as shown in Figure 13. Alternatively, Figure 12 illustrates how the OJEI benchmarks could be used for tracking progress for each target competency across all 14 steps of the OJEI^{SM} method. Based upon these performance “facts” the employer administers the economic incentives.

Under the OJEI^{SM} method skill validation and skill measurement is a required part of step 112. This measurement step occurs by the instructor when giving a rating of the learner’s progress through the OJEI instructional steps for each target competency. Figure 12 illustrates how this might be done where each check (√) indicates that a learner has received an OJEI level of instruction (shown across the columns) for each competency (shown by row) using the OJEI 14 step scale.

Figure 13 illustrates a simpler variation of this principle through use of a 0 through 9 point psychomotor scale. The 0 through 9 scale shown in Figure 13 is tied to Skill Technologies’ Knowledge Explorer web tracking tool.

Step #	← Instructor Led Training →							← On-The-Job →					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Student-Worker Rating Scale	Start	Knowing			Application in the Classroom				Application on the job			Achievement		Credentialed
The skills, knowledge and personal attributes tied to deliverables will-map to target competencies	*Preparation*	*Explain Process Life Cycle*	*Define Deliverables & Components of the Process*	*Probe for concept & process Understanding*	*Assign Selected Sample Work Deliverables*	*Construct the Sample Work Deliverable*	*Review Worker Progress & Performance*	*Test Knowledge*	*Apply Skills to Full Scale Deliverables*	*Evaluate Worker's Progress*	*Providing Work Performance Measures*	*Assess Work Performance*	*Assess Skill, Knowledge, Attainment*	*Committee Assesses and Awards Credential*
1. Conduct stakeholder needs analysis														
2. Prepare Project Charter		√			√	√	√	√	√	√	√	√	√	√
3. Identify the organizational structure (e.g. weak matrix or strong matrix) in order to determine project effects			√	√	√	√	√	√	√	√	√	√	√	√
4. Evaluate and further define the project scope statement.		√	√	√	√	√	√	√	√	√	√	√	√	√
5. Communicate quality-related inputs of the		√	√	√			√							

Figure 12---A Checklist Use of the 14 OJEI[SM] Steps to Record and Assess Instructional Progress on a Subset of Project Management Competencies

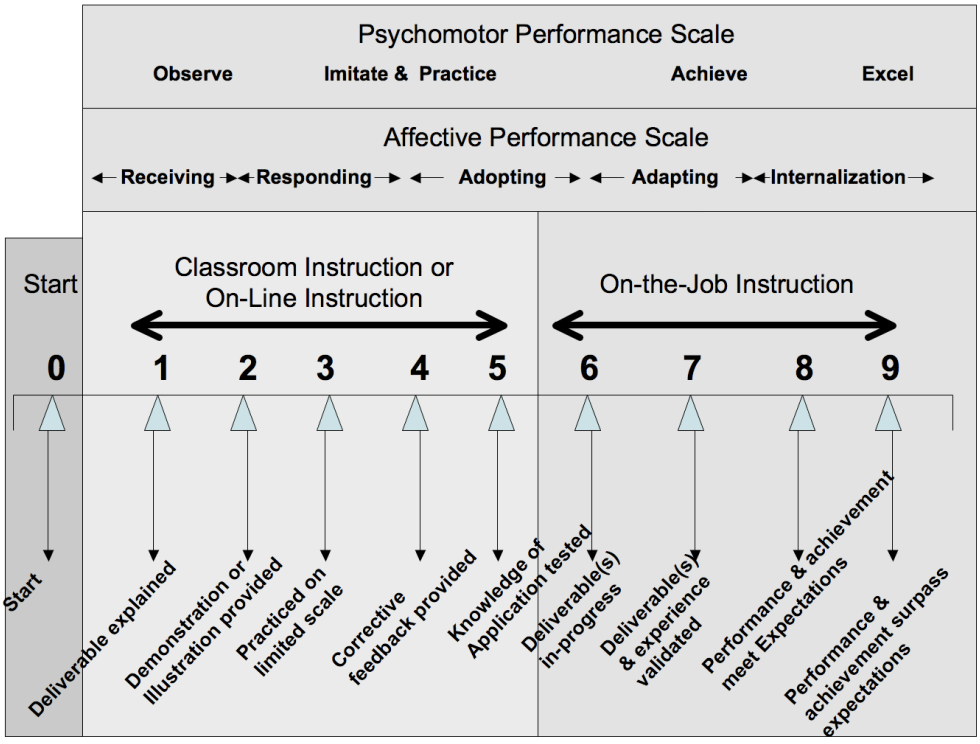


Figure 13--- How OJEI[SM] Benchmarks Can be Used to Scale Measurement of a Learner's Knowledge, Skill Development and Adoption for Each Target Competency

IA Competencies	Alvey, Robert	Clark, Robert	Dearinger, Larry	Erickson, Brent	Evenson, Jake	Kistler, Jeff	Krell, Tim
1-1.1 Terms and Acronyms	4	9	9	4	4	4	9
1-1.10 OCTAVE Framework	0	2	2	2	1	1	4
1-1.2 Information Assurance Organization	2	9	9	4	1	5	9
1-1.3 Password Security Concepts	9	9	8	3	5	6	9
1-1.4 Security Risks and Threats	6	8	7	3	4	5	9
1-1.5 Security Policies	5	8	4	3	4	5	8
1-1.6 Security Ethics	6	8	7	3	5	5	9
1-1.7 IA Specialization Career Fields	3	8	7	3	3	4	8
1-1.8 Classification Levels	0	8	8	3	5	6	9
1-1.9 Internal Security	5	8	7	4	4	5	9
1-2.1 Network Troubleshooting	7	8	8	2	5	6	9
1-2.2 Advanced Router Administration	6	8	7	2	4	4	8
1-2.3 Securing the Network Backbone	6	8	8	3	4	3	7
1-2.4 Organizations Network Layout	6	8	7	3	5	4	9

Figure 14---Example of Using the OJEI Benchmark scores (0-9) with a Software Tool to Record and Evaluate the Knowledge and Skill Development of Learners for Each Target Competency…… Information Assurance Example

3.10) Stage 4----Step 114- Evaluating Performance and Provide Credential

When performance targets for both business outcomes and learning have been achieved, the learner is ready for the final step 14 **Evaluating Performance and Provide Credential.**

During this step a committee organized by the employer will review:

- the learner's learning progress
- productivity and business outcomes

The committee evaluates the individual learning progress and business outcomes of the learner's project to make a determination as to readiness for credentialing the learner. The instructor may attend the committee review meeting along with the learner. The committee assesses the learner's development and performance and elects to accept or reject the learners request for credential. The committee can use scaled Cognitive, Psychomotor and Attitudinal scaled scores or the OJEI[SM] instructional benchmarks assess the extent to which each student worker has progressed through the process for each target competency. Software tracking tools are ideal vehicles to provide the committee with detailed progress reports on each learner.

Since attainment of the target business outcomes for the project are equally important in making the determination to award the credential, the committee will also consider the scope, schedule, cost and quality performance of the project as well.

For any deliverable or competency for which the committee believes that the learner shows a lack of performance evidence or knowledge or skill gaps, the instructor should provide the learner with the necessary iterations of instructional micro loops including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction until deficiencies are removed.

The learner can re-petition the committee assessment. When the learner who is being assessed is deemed "ready and complete' in terms of knowledge/skill attainment and performance on the job, the worker is awarded the credential of completeness.

The employer's committee (or a training process owner) may elect to track simultaneously the development progress of all their learner's who are being trained in a single database. Figure 17, shown in the appendix, depicts a partial view as to how the OJEI process can be scaled and used for progress tracking of all employees who are being trained.

The committee awards the completion credential to the learner when all competencies reach level 4 of the OJEI[SM] process and when the project meets the targeted level of business performance. The employer continues to administer economic incentives based upon demonstrated competency and productivity on the part of the worker.

4.1) Delivery Considerations, Options and Resources for Apprenticeship and On-the-Job Training

The transition from the traditional delivery approach to apprenticeship and OJEI is tied to the adoption of formal on-the-job training (OJT). In practice educational institutions struggle to deliver OJT, but they certainly can help employers deliver it in a cost effective way. The CompTIA/DOL NITAS program http://nitas.us/resources/documents/2005_prog_guide.pdf serves as an excellent model for educational institutions to replicate and to refine for their own situations. In addition, the U.S. Department of Labor's Employment and Training Administration (ETA) http://www.doleta.gov/OA/ has an apprenticeship group who can help get you started.

One of the simplest ways for educational institutions to adopt OJEI is to embed it into internships, cooperative programs or any school-to-work programs. To accomplish this the OJEI standard can be used as the guiding document to structure those programs. This enables schools do relationship building between schools and employers to provide the OJT to students

A second educational approach, advocated by professor Henry Mintzberg and his colleagues is for schools to embed degree and/or non-degree management programs into real business ventures http://www.impm.org/overview.htm. In addition, Mintzberg has presented some path breaking concepts in coaching for on-the-job training which are also cost effective. He refers to one method as "coaching ourselves" http://www.coachingourselves.com/. Also listed below are links to papers on the authors website that deal with the implementation of 21st century apprenticeship http://www.proj-mgmt.us/whitepapers.htm .

4.2) Assessing Program Compliance to OJEI[SM]

Throughout Section 3 we reviewed the criteria required for an educational institution or a training organization to become compliant with OJEI[SM] practices. The accompanying document, *OJEI[SM] Compliance Checklist Supplement,* summarizes these criteria suggesting how an auditor would make a judgment as to goodness of fit, compliance and required remediations. Once the educational or training program that is being assessed has identified its deficiencies and remediated its performance gaps, the program will be eligible to receive a certificate of compliance to this standard.

Appendix 1

Why a "*Deliverables Orientation"* is Important for Ensuring Effective Delivery of Training to Knowledge Workers Who Work on Projects

Section 3.4 included mention of the "deliverables orientation" of the OJEI[SM] method. Appendix 1 provides clarification and a supporting rationale for this requirement.

Thomas and Baron (1994) defined "Knowledge Work" as being all work *whose output is mainly intangible, whose input is not clearly definable, and that allows a high degree of individual discretion in the task*. This description implies that Knowledge Work is unique, individualistic and potentially chaotic. To a great extent this is the case and this becomes the reason why training needs to be provided to these workers in the first place. It is training that enables Knowledge Workers to become productive and their employers to become/remain competitive. But the question that arises is "how do we train people under these circumstances?"

By definition a deliverable is a measurable result or output of a process. Deliverables, both final and intermediate, within a project tend to be tangible items that anchor the project with concrete, testable outputs throughout the entire project life cycle. Because of their tangibleness deliverables play a very important role in the design and delivery of training to Knowledge Workers who work on projects. By anchoring the training process in deliverables the instructor can:

1. understand how effective the training was for the learner to date
2. identify rate of learning and performance improvement by the learner
3. adapt and adjust the on-the-job training to the real time needs of the learner
4. identify areas of deficiency that require additional training and remediation
5. identify whether or not the business objectives of the project are being met
6. estimate how long the on-the-job component of the training will need to continue.

Deliverables are often more complex than they first appear, yet their usage allows the delivery of competency-based training on the job to become greatly simplified and shortened in duration. Let's explain these points through example.

If we again consider the hypothetical project illustrated in Figure 7 in section 3.4 (page 15), we notice that the project manager has three deliverables that thread through the project life cycle. As the project traverses through the life cycle the deliverables are expected to reflect the level of maturity and the state of readiness that is appropriate for the project at a point in time denoted by the small triangles.

Let's assume for the moment that we are instructing the project manager, and imagine that this project (Figure 7) is his/her project to manage. We further assume that the project is in the execution (build) phase, and that project manager's next scheduled deliverable is to produce a status/performance report indicating that the project is on schedule. We see immediately that producing the report is simple, about 30 minutes of work. The document itself is only the tip of the iceberg (so to speak) in terms of effort. Because the report must show that the project is performing on schedule, the project manager needs to properly execute time management techniques on the entire team. These managerial activities represent the bottom (invisible) part of the iceberg that constitutes the bulk of the work.

Figure 15 below illustrates the "Iceberg Analogy". We see that the report itself is represented as the deliverable being the tip of the iceberg. However, shown below the deliverable in Figure 15 (the part of the iceberg below the surface) is the milieu consisting of the myriad actions that must be performed successfully by the project manager as well as by others (under the direction of the project manager) in order to meet the schedule and readiness objectives of the deliverable. It is for these actions below the surface that the instructor must provide instruction and guidance to

the project manager; it is for these actions below the surface that the project manager as a learner must obtain proficiency. Moreover, it is these actions below the surface that typically constitute the list of target competencies for the training that will allow justification for awarding credentials.

All of this suggests that it is at the **deliverable level** where the learning objectives and the business objectives intersect. Therefore, if the instructor focuses the delivery of training on preparing the student for deliverable readiness, the learner will quickly confront and master the required knowledge and skills within the context of meeting the business needs of the project. In this way the instructor will be able to deliver instruction in a completely contextualized manner, and the instructor will be better able to demonstrate the improvised nuances of the job while also being accountable to show that his/her training content actually works. The instructor also will obtain tangible visual evidence by inspecting the documents (deliverable artifacts) and by listening to the learner's comments and answers to questions about the work performed.

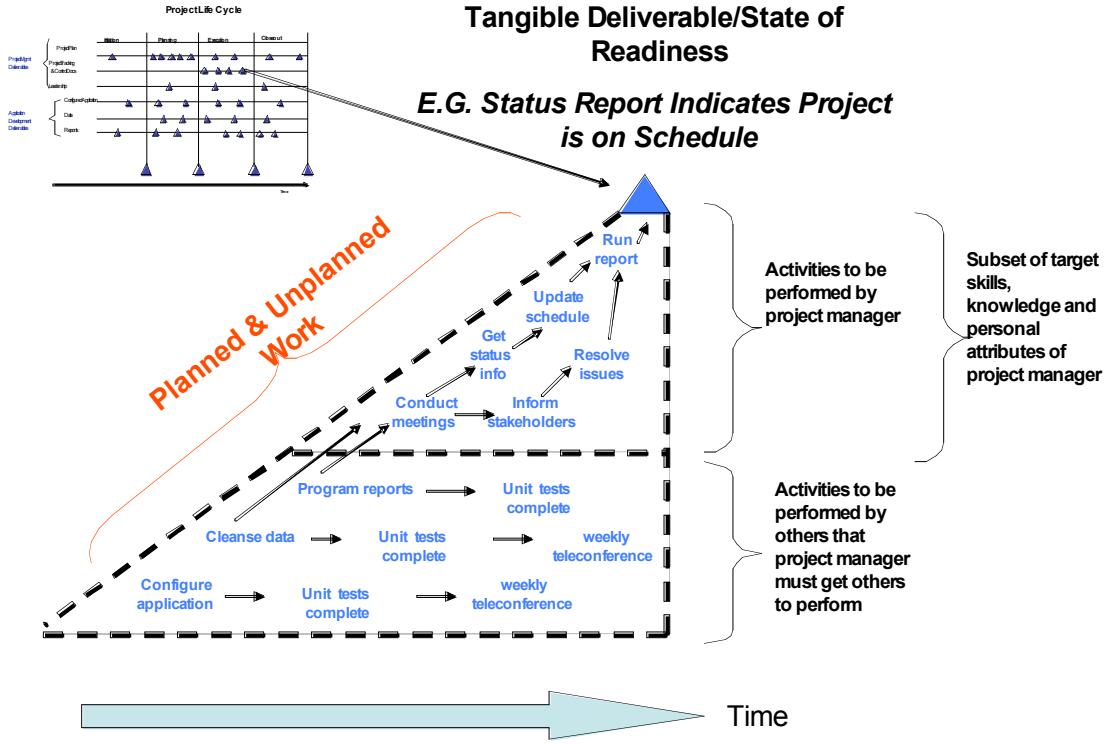


Figure 15---Illustration of the "Iceberg Analogy" Showing Actions Beneath the Triangle that Comprise the Deliverable

To operationalize the on-the-job-training the instructor and learner meet routinely (commonly once every two weeks for about 30 minutes per session). During and between each of these routine meetings the process, as appropriate, follows an iteration of the instructional micro loops including: 1) Explain & Demonstrate; 2) Let the Learner Do; 3) Assess the Quality of the Deliverable; and 4) Provide Guidance & Correction. The instruction provided during each meeting focuses on the instructor's recommendations as to the steps required to successfully complete the next deliverable in sequence. The *"30 day Deliverable Lookahead form for On-the-Job Instruction"* is a useful tool for structuring these meetings and improving communications.

The on-the-job meetings between the instructor and learner continue throughout the entire project life cycle and until the learner successfully completes the target deliverables and demonstrates adequate skill and knowledge for each of the steps that constitute the target competencies. The relatively short durations of roughly 30 minutes per meeting prevent the process from having significant adverse impacts on productivity due to the workers' time away from their jobs.

The tenor of each cycle of an on-the-job instructional micro loop is, at first, much like a physician guiding a patient. The instructor (similar to a physician) tries to create awareness and makes kindly suggestions to the student worker (analogous to being the patient) as to which activities are likely to be forthcoming over the next 30 days or so. The instructor also provides recommendations such as "tips and tricks" and highlights potential problems and explains how to avoid them. The instructor also attempts to gain acceptance and personal buy-in to these recommendations from the learner. Much like using the prescription tablet that physician's use, an instructor completes the "30 day Deliverable Form" discusses recommendations with the learner and gives the document to the learner to take for later reference.

Following the meeting, the learner goes off to work independently and implement (i.e. **"Do"**) the instructor's suggestions while on the job. After approximately two weeks or so of working independently the learner meets again with the instructor to review the results and provide guidance. The instructor will inspect the tangible work products (i.e. the deliverable/artifact) to assess and ask questions of the learner about how he/she performed the work. Based upon this assessment the instructor provides guidance and correction which will continue until the student worker delivers the right result and provides evidence of proficiency. This completes the loop, and then the instructor and student worker will re-start another loop with the next deliverable. Again, it should be emphasized that the *"30 day Deliverable Form"* is an important tool to structure the consistent execution of each micro loop during the on-the-job portion of the training.

As time goes on through the project life cycle and the learner gains experience and confidence, the meetings between the learners and the instructor become less directive in that the instructor will play more of a collegial role helping the learner resolve higher level issues that require judgment. Also, the learner begins to take a more independent role in preparing for the development of deliverables. The learner may perform the 30 day lookahead planning independently and the instructional micro loop may be used less frequently.

The "30 day Lookahead" form is shown on the next page (page 33). Variations of this form exist such as the one shown on page 34 using a Job Instruction Training Coaching-Mentoring method . The reader should refer also to page 20 in the the associated document *OJEI[SM] Compliance Checklist Supplement* for an additional example.

30 Day Deliverable Look Ahead Form for On-the-Job Instruction

Deliverable(s):

Meeting Date:

Student Worker Name:

Instructor Name:

Deliverable Readiness Criteria:

1)_____

2)_____

3)_____

4)_____

Suggested Activities to Obtain Readiness

Week	Suggested Activity	To Be Performed by:	Tips & Tricks	Look out for.....	Expected Tangible Output s
Week ending:______					
Week ending::______					
Week ending::______					
Week ending::______					
Week ending::______					
Week ending:______					
Week ending:______					

Outcomes Assessment and Issues:

_____

_____

_____

_____

Outcome Acceptable?

☐ Yes

☐ No

Knowledge & Skill Areas Still Needing Development:

_____

_____

_____

Mentoring and Coaching Session Record Using Job Instruction Training

Learner:_____ **Mentor/Coach:** _____

Session Date:___/___/___ **Target Deliverable to be Discussed in Session**

Target Competencies :_____

Get Ready for Instruction (Checklist) √:

- **Have a timetable.** *(Determine how much skill you expect the learner to have by when)*__
- Break the deliverables down *(List work products, important steps and key points)*__
- Have everything ready *(The right equipment, supplies, etc)*__

Instruct the Learner

- **Put the learner at ease; get the learner interested in learning the job**__
- **Define the Deliverable or Work Product Resulting from the Execution of this Competency and the Required Quality Criteria. Find out what the learner already knows about it.**__
- **Find out what is already known about the job**__
- **Present the Operation (tell, show, illustrate one important step at a time, stress key points.**__
- **Have the learner try out the operation. Provide coaching, guidance and correction.**__
- **Let the learner explain the operation, make sure the learner understands.**__
- **Continue until you know the learner fully understands.**__
- **Let the learner perform the operation independently. Designate a person to go to for assistance. Check frequently and encourage questions.**__
- **Continue until you know the learner fully understands.**_

Assess Stage of Adoption by the Learner

- **Receiving**
- **Responding**
- **Accepting/Adopting**
- **Adapting**
- **Advocating/Exemplifying**

Identify efforts required to help the learner adapt the classroom instruction or theory to successful application on the job.

Learner's planned activities over the next 10-30 days on this deliverable:

Record Learning Progress:

-Circle the appropriate scaled level of learning and performance on the back side of this sheet.

-Record progress in **SKAT** database

Manage Issues or Follow up:

Issue description or Follow up Required:

_____
_____
_____

Appendix 2

OJEI[SM] Scale Transformations

The OJEI[SM] scoring method for tracking the progress of the learner can be made compatible with other scales by the use of scale transformation. The following table (Figure 16) shows how the OJEI[SM] scale could correlate with the Know-Do-Exit scale that is used with the CompTIA/DOL NITAS program.

This transformation suggests that a competency sign-off on a NITAS "Know" would be equivalent to completing OJEI[SM] steps 2, 3, 4 and 8 for that competency. A NITAS "DO" would be equivalent to adding OJEI[SM] steps 5, 6, and 7. A NITAS "EXIT" would be equivalent to adding the completion of the remaining OJEI[SM] steps 9, 10, 11, 12 and 13.

It should be noted that this is one transformation possibility, and the reader should use his/her own judgment.

Scale Comparisons

Start	NITAS™		OJEI℠
Worker Receives Explanation & Demonstration of Skill & Answers Test Question *Classroom*	**Know**		2,3,4,8
Worker Successfully Applies Skill to a Real but Limited Scale Case from Workplace Project With Corrections from Instructor *Classroom*	**Do**		5,6,7
Worker Successfully Applies Skill to Full Scale Case in Workplace With Error Correction from Mentor *On the job*	**--**		
Worker Demonstrates Related Knowledge, task proficiency and Delivers Targeted Performance Outcomes *On the job*	**Exit**		9,10,11, 12,13
Credential awarded when --learner completes all deliverables -- attains proficiency on all target competencies --achieves targeted business outcomes			14 *Credentialed*

OJEI step #

Figure 16

Another transformational possibility exists for scaling between OJEI instructional benchmarks and well established learner benchmarks in the psychomotor domain. For example, Figure 17 below illustrates the correlation between OJEI benchmarks and a psychomotor scale that has been tailored for use with Knowledge Workers. This correlation synchronizes learner progress with instructional progress which facilitates the administration of skill validation and tracking in training programs.

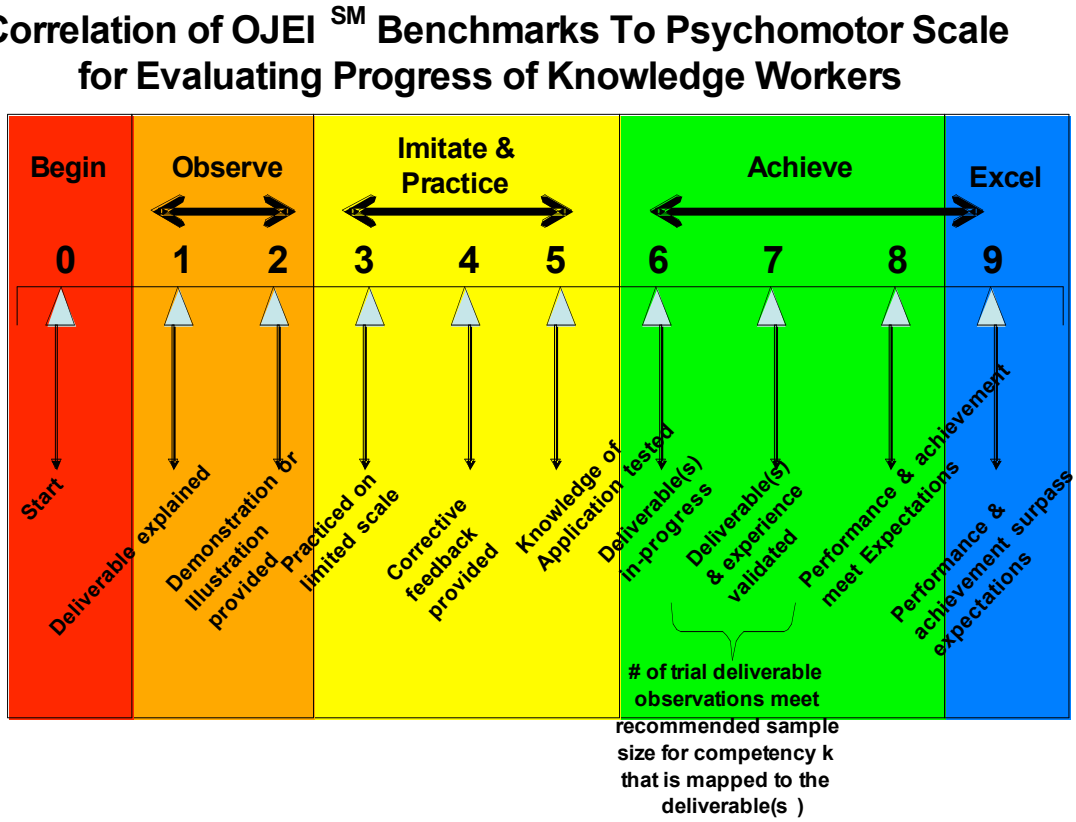


Figure 17: Correlation of OJEI Instructional Benchmarks to Psychomotor Benchmarks

Appendix 3

OJEI[SM] Scale Skill Tracking Software

We used Figure 13 and 17 to illustrate a psychomotor rating scale associated with the 14 step OJEI[SM] instructional method. In practice an instructor can use this scale to rate and record the learning progress and on-the-job skill performance of a learner across each target competency. As discussed the OJEI[SM] scale reduces the 14 step instructional method down to a 10 point rating scale (0 through 9) that is tied to "doing" instead of just "knowing". It is important to keep in mind that the value of OJEI[SM] is to add a "doing" component. Schools already deliver the "knowing" component quite well.

Figures 18 and 19 illustrate these operational principles by showing the use of SKAT--a Knowledge Explorer software tool that enables an instructor to record, report and manage the developmental progress across a number of workers on a set of target competencies. The colorful DNA chart shown in Figure 19 is quite effective in visually displaying progress of all learners at a glance.

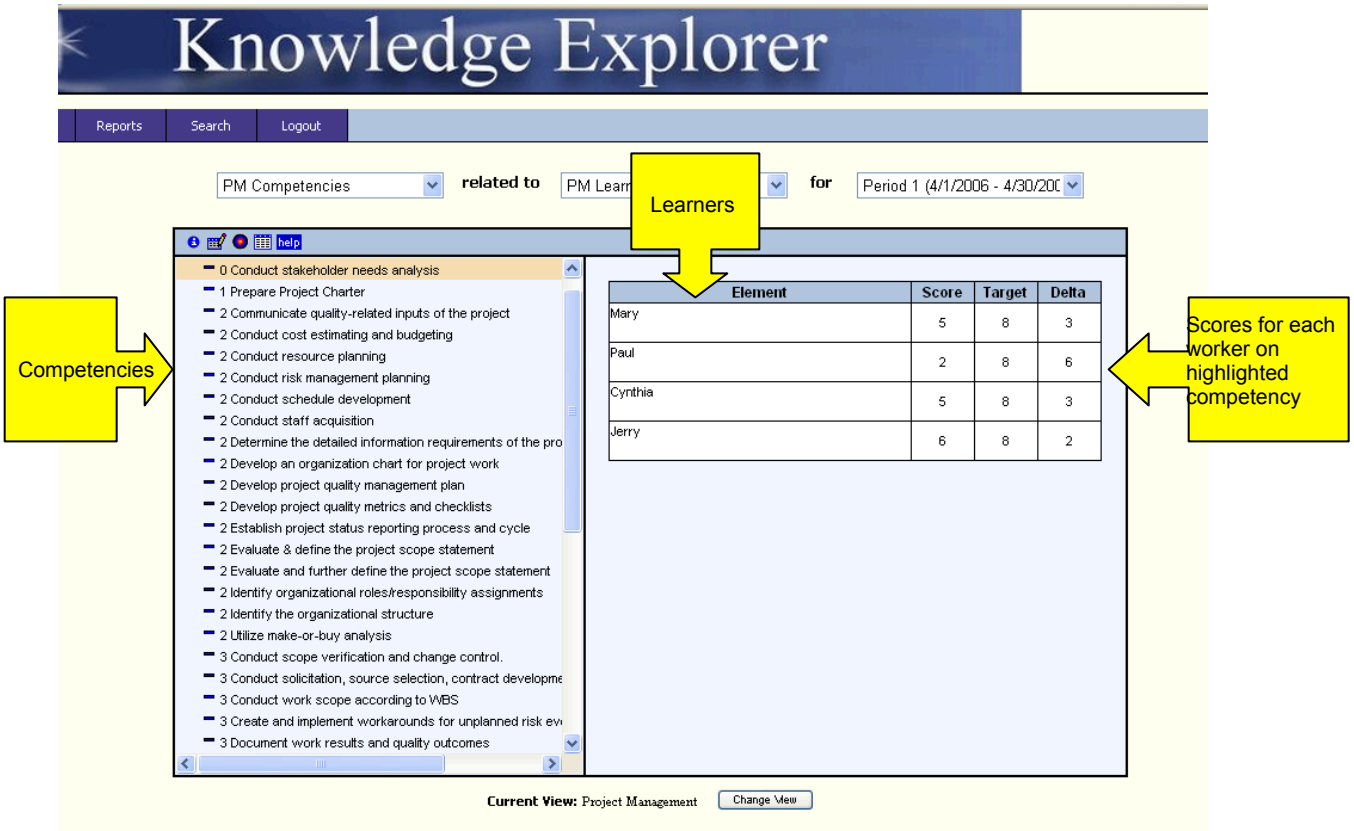
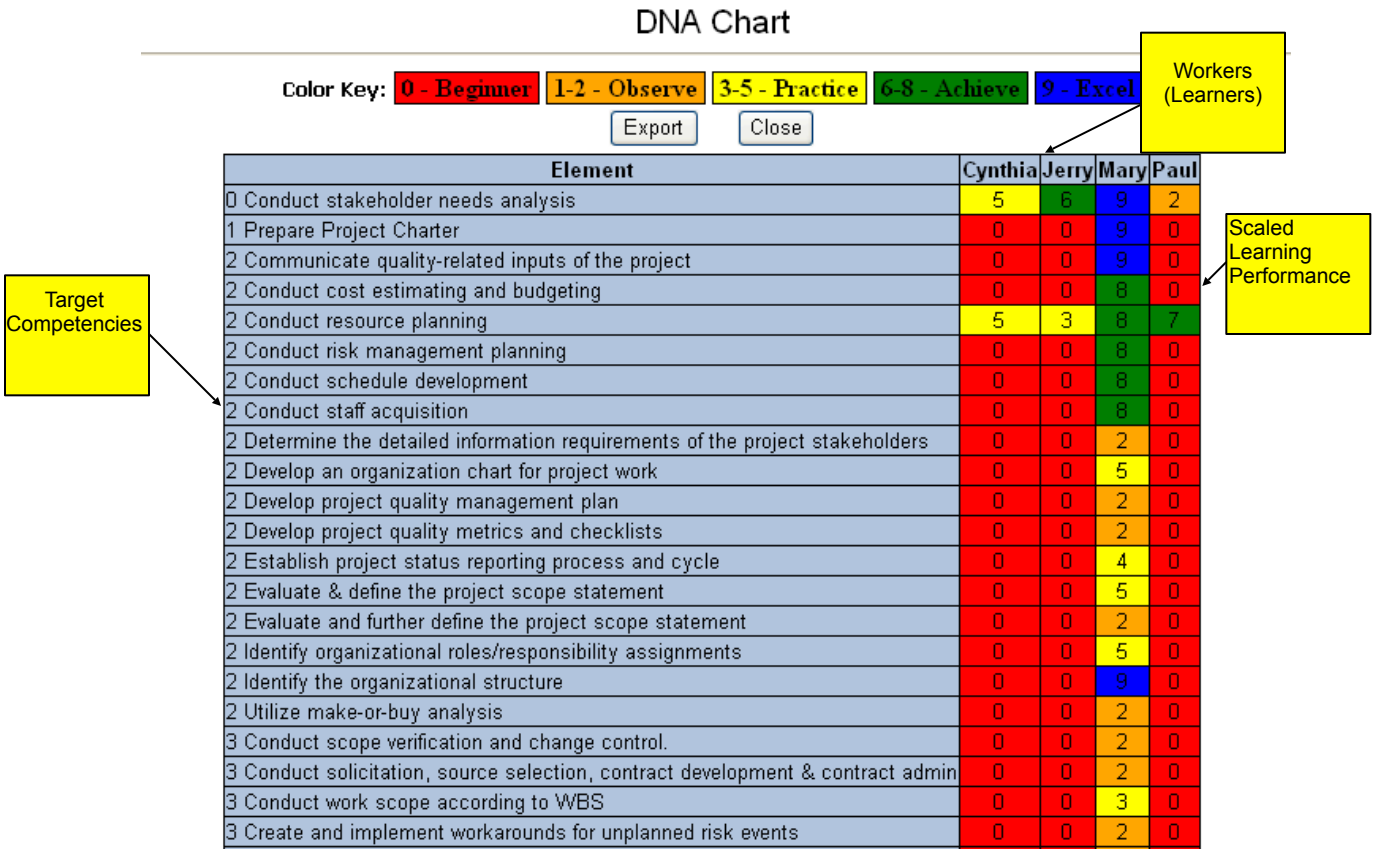


Figure 18: The Knowledge Explorer Tracking Tool Input Screen



Element	Cynthia	Jerry	Mary	Paul
0 Conduct stakeholder needs analysis	5	6	9	2
1 Prepare Project Charter	0	0	9	0
2 Communicate quality-related inputs of the project	0	0	9	0
2 Conduct cost estimating and budgeting	0	0	8	0
2 Conduct resource planning	5	3	8	7
2 Conduct risk management planning	0	0	8	0
2 Conduct schedule development	0	0	8	0
2 Conduct staff acquisition	0	0	8	0
2 Determine the detailed information requirements of the project stakeholders	0	0	2	0
2 Develop an organization chart for project work	0	0	5	0
2 Develop project quality management plan	0	0	2	0
2 Develop project quality metrics and checklists	0	0	2	0
2 Establish project status reporting process and cycle	0	0	4	0
2 Evaluate & define the project scope statement	0	0	5	0
2 Evaluate and further define the project scope statement	0	0	2	0
2 Identify organizational roles/responsibility assignments	0	0	5	0
2 Identify the organizational structure	0	0	9	0
2 Utilize make-or-buy analysis	0	0	2	0
3 Conduct scope verification and change control.	0	0	2	0
3 Conduct solicitation, source selection, contract development & contract admin	0	0	2	0
3 Conduct work scope according to WBS	0	0	3	0
3 Create and implement workarounds for unplanned risk events	0	0	2	0

Figure 19: The DNA Progress Report from The Knowledge Explorer Tracking Tool. Note the "Traffic Light" Color Key