Best Practices for Personnel Certification

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Abstract

The term "best practices" was introduced to the author when he worked in the steel industry on quality improvement and reliability improvement projects. Best practices are not as esoteric as "World Class performance", nor are they as mundane as a "standard operating procedure" The term denotes a well thought out approach to achieve an important goal by using every good idea possible to "do the right things" and just as importantly, to "do the right things well"

This paper provides an overview of why personnel certification schemes were started and are still needed. Influences and issues affecting personnel certification programs are discussed, along with some best practices to address them. Examples to illustrate the best practices are provided from a variety of personnel certification schemes for different occupational areas.

Introduction

The amount of knowledge in the world has grown exponentially over the last several hundred years. It has been so explosive that "pencil and paper" institutions and "bricks and mortar" companies of the 19th century face serious challenges from competitors that only exist in a virtual sense within the realm of digital technology. This relatively new technology is enabled, aided and abetted by computers, software and the Internet. As the world becomes increasingly digitized and globally connected, individuals and their organizations must adapt to survive in the information age. For those that do, significant opportunities exist. For those that don't, problems leading to their demise may be imminent.

Countries such as the United States, Canada, Britain and Australia that have the aging population demographic ubiquitously known as the "boomer generation" can be said to have two types of "immigration". The first is immigration in the traditional sense whereby people from other countries arrive to become citizens in a host country. The benefit to the immigrant is personal opportunity to improve their lot in life. The benefit to the host country is to have a workforce that can support economic growth that could otherwise not be maintained by the host country's fertility rate and birth rate. However, this has introduced a significant amount of cultural diversity to the host countries, which sometimes creates problems due to the native residents of the host country misunderstanding the culture of their new citizens. And the new citizens sometimes struggle; as they perceive that their cultural identity is being assimilated into the culture of their new home.

On a different note, Marc Prensky defines a second type of "immigration" that has produced a digital immigrant. [1, 2] Digital immigrants are the people born into the analog world before the personal computer (PC) was invented. They either became fascinated with PC's and wanted to use them as they became mainstream, or eventually had no choice but to use them to compete in the job market. The new competition is what Mark Prensky describes as a digital native. A digital native is a person who was born into and grew up as a native speaker of the language of computers, software and the Internet. They are the youngsters who taught their parents how to program the VCR! The differences between digital immigrants and digital natives are vast not only in age. The synergistic growth of knowledge and digital technology extends directly into the fundamental concepts of how people are taught, learn and subsequently demonstrate their knowledge and skills. In terms of their education, Marc Prensky asserts, *"Our students have changed radically. Today's' students are no longer the people our educational system was designed to teach.* But this is not just a joke. It is very serious, because the single biggest problem facing education today is that *our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language."*

The growth of digital technology, cultural diversity and demographic differences are exerting tremendous pressure on everyone in the business of education, training and personnel testing. It has become imperative for people in leadership positions to adapt what they do, and how they do it, to meet the needs of the next generation workforce. To that end a best practices approach for education, training and personnel certification is more than sensible, it is practically mandatory and should be always be investigated. Otherwise the education, training and personnel certification programs so highly regarded to date might suffer the same fate as phonographs, LP records, 8-track cassettes, Walkmans, CD's and DVD's, i.e. will people want to keep using them?

What is Certification?

A definition of certification found on the Internet is: [3]
- the act of certifying or bestowing a franchise on.
- validating the authenticity of something or someone.
- a document attesting to the truth of certain stated facts.

And a standard dictionary definition is: [4]
- The act of certifying or guaranteeing.
- The state of being certified.
- A certificate.

In addition to the definitions above, the context of this discussion is further assisted by the description of a personnel certification body as provided by the Standards Council of Canada, which is: *Personnel certification bodies provide services for many professional and trade persons such as auditors, welders, and doctors. The role of certification bodies involves assessing the individuals'*

necessary competencies, and ensuring these are appropriate to the work being performed. [5]
Another organization that defines a professional credentialing is the National Organization for Competency Assurance (NOCA). In the publication "Guide to Credentialing Concepts" [6] primary author Cynthia C. Durley notes, *"There are 5 major criteria that distinguish a professional credentialing (certification, licensure or registration) examination from an end-of-course examination:"*

1. A professional role delineation or job analysis is conducted and periodically validated.
2. A demonstration of how the examination is linked to a defined body of knowledge, based on the professional role delineation or job analysis, is provided.
3. A demonstration of reliability and validity of the examination, based on psychometrically accepted statistical methods, is provided.
4. A minimum passing score is developed psychometrically accepted statistical methods.
5. When a professional credentialing examination is part of a professional certification, credential maintenance or recertification is (or should be) required.

The Value Proposition for Certification

In the early 1900's many countries underwent a massive shift from an agricultural economy to a manufacturing economy. The new manufacturing economy replaced craftsman who produced something from start to finish, with assembly line workers who worked on just some portion of an overall product. One problem with the new assembly line method was that defects produced in one area were passed along to create a problem in another area, or even worse, to the customer. This was remedied by the introduction of a new job, that of the Inspector. The originator of the modern scientific management movement, Frederick Winslow Taylor, described the new role in 1911 as: *"The Inspector is responsible for the quality of the work, and both the workman and (speed) bosses must see that the work is all finished to suit him. This man can, of course, do his work best if he is a master of the art of finishing work both well and quickly"* [7]

Many years later, personnel certification schemes serve to ensure many more people, not just limited to Inspectors, can live up to today's version of Frederick Taylor's original expectations. The people being certified are pilots, doctors, nurses, financial planners; fitness trainers and educators, to name just a few. They are often known as technicians, practitioners or subject-matter-experts (SME's). They gain value from the professional development they first undertake to become certified, and the additional professional development they need to remain certified. Their certification has value because it credentials the special knowledge, skills and competencies that often can't be attested to by an academic diploma or degree. Personnel certification programs can be indispensable in discriminating between "people who know and can do" and "people who don't know and cannot do". For example, the Society of Tribologists and Lubrication Engineers (STLE), after almost 10 years of development, in 1994 launched the Certified Lubrication Specialist (CLS) program in direct response to requests from people employed in the lubrication business who wanted a way to raise their profile and demonstrate the expertise brought to their profession.[8] People seek certification in high risk occupations such as finance, investment banking, healthcare, education, aerospace, civil aviation, power generation, oil and gas exploration, refinery operations, petrochemical processing, boiler and pressure vessel manufacture and operation, and the military. The public at large places value on the skills of people who have been certified in those occupations because of their expertise.

Some people see value in pursuing multiple levels and types of certification. Their motivation often stems from wanting a holistic understanding of a subject, or to be outstanding in the job market, or to have the self-satisfaction of demonstrable achievement. Hence personnel certification bodies deliver value by developing and maintaining personnel certification programs to ensure employers and the public confidently benefit from the expert and efficient application of knowledge and skills, while enhancing on-the-job satisfaction of the certificants.

The Business Case for Personnel Certification

In addition to the value proposition for personnel certification, there is also a business case, especially when viewed as a risk mitigation strategy. Risk management methodologies are used to deal with hazardous events of low probability but having very undesirable high-impact consequences such as multiple fatalities or environmental damage. When thinking about personnel certification as a risk mitigation strategy, it could be said they deal with two types of human error: 1) having sound knowledge and good skills, but following a bad plan in good faith and getting the wrong result, or 2) not having sound knowledge and using poor skills to produce the wrong result, even while following a good plan. Some of the worst catastrophes of the 20th century that resulted in the loss of human life and millions of dollars of environmental damage are the result of human error. [10, 11] The training and skills development invested in personnel certification can have a return-on-investment (ROI) of several thousand percent, or a payback period of less than days or weeks when calculated for high-risk industries.

Figures One and Two are examples from a risk assessment method known as the tie-line method. While originally developed in the 1970's for the railroad industry in Australia [9], it is used here to simulate the difference in risk levels for the hazards associated with doing something right or wrong. To more accurately put the tie-line method in the context of training and certification, further research and study would be needed to qualitatively and quantitatively assess how human factors and training variables influences error and reliability, and how effectively a personnel certification process "guarantees" or "predicts" competent, accurate and reliable human performance. That is beyond the scope of this paper, but certainly within the means of the organizations seriously engaged in personnel certification.

Figure One – *Tie-line method for Risk Analysis: Case #1*

- Frequently allowed to do work with hazardous consequences.
- Potential for serious injury or damage.
- Almost certain to do something wrong because of poor training and certification testing

= **High Risk**

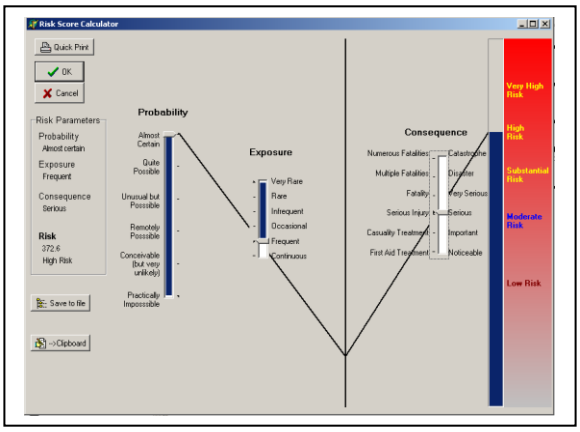
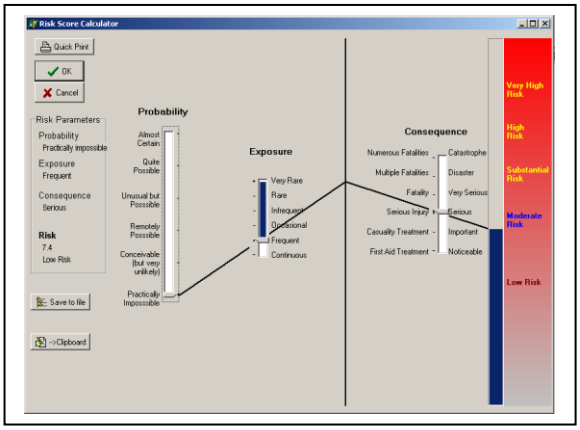


Figure Two – *Tie-line method for Risk Analysis: Case #2*

- Frequently allowed to do work with hazardous consequences.
- Potential for serious injury or damage.
- Practically impossible to do something wrong because of good training and certification testing

= **Low to Moderate Risk**



Regulatory requirements are often created as a result of catastrophes affecting the public on a large scale. Even when no regulatory requirements are mandated, industry will often voluntarily become self-regulating and seek out better approaches that include specialized training and personnel certification. For example, the Society of Maintenance and Reliability Professionals (SMRP), after 5 years of development, launched in 1998 the Certified Maintenance and Reliability Professional (CMRP) certification program. It was a direct response to people in manufacturing industries who wanted to identify the skills and competencies needed to improve the reliability of physical assets and reduce the exorbitant costs of unreliable designs and reactive maintenance programs. [12]

Types of Personnel Certification Schemes

A quick reminder is provided as to the various types of personnel certification schemes that are available. They all co-exist in the market place, and that in and of itself sometimes leads to confusion and mistrust in any type of certification at all. The three main types of certification are:

- 1st. Party (self assessment or pronouncement)
- 2nd. Party (supplier or employer assessment)
- 3rd. Party (independent certification body assessment)

While they should all theoretically be able to discriminate between people who know and people who don't, it is the authors' experience that any of them can be diluted or trivialized and rendered irrelevant to the subject domain unless a best practices approach is followed.

Best Practices for Personnel Certification

Complex work involving difficult problems and daunting tasks rarely have one easy, single way to be done. In other words, there is no "silver bullet" for success. This is also true for the best practices for personnel certification. Ignoring or giving lip service to them impugns the integrity of the certification program and disrespects individuals who would place their trust in it. It is far more desirable and meaningful to develop a personnel certification program that embraces all known best practices. With that encouragement in mind, the best practices are:

1. Public domain and access
2. Peer reviewed body of knowledge (BoK)
3. Standards referenced
4. Psychometric analysis of test items
5. Preparation and training
6. Surveillance and renewal
7. Recertification
8. Program accreditation

Following are the rationale for each best practice along with some examples and further references.

1. Public domain and access

Public domain and access is usually intrinsic to personnel certification programs, because personnel certification bodies want people in a given profession to be attracted to their programs. Anyone reasonably competent and familiar with the subject domain should be encouraged to attempt the certification test(s). People should be able to attempt the certification without having to satisfy extraneous obligations such as purchasing a society membership, or paying usurious amounts of money. For example, if membership in a society is a mandatory eligibility requirement for certification, the program works at cross-purposes of membership recruiting and retention versus failing or passing candidates. If the certification process requires excessive and unjustifiable amounts of training, work experience or money, those too will become deterrents that discourage candidates and direct them to inferior options for professional recognition.

For occupations requiring licenses or certification, public domain and access encourages labor mobility so that people can work in their specialized occupation wherever opportunities exist. Many tradespeople must be licensed before they can do their work, and this is analogous to people who need certification before doing theirs. An example of a system that encourages workforce mobility is the Interprovincial Standards Red Seal Program that was established more than 45 years ago in Canada. [13] It is a very good program encompassing hundreds of occupational roles that can be practiced across Canada. It has many ideas for best practice that other organizations can consider. For example, the Red Seal Program acts as a cohesive national umbrella to unify regional requirements for trades people.

2. Peer reviewed Body of Knowledge

The Body of Knowledge (BoK) is also sometimes referred to as a training syllabus. The BoK is a vitally important document because it defines the scope of what is to be taught, tested and sometimes demonstrated for a given subject domain. A panel of subject matter experts who are thoroughly familiar with the necessary occupational skills and competencies initially develops the technical depth and breadth of the BoK. The BoK must be reviewed and updated at regular intervals to remove obsolete content and add new knowledge and skill requirements. It is a key reference that provides an interface between educators, personnel certification bodies and certification candidates. Used correctly, it prevents educators from "teaching the test questions", because they should not know exactly what they are. And the BoK helps certifying bodies test knowledge at the proper level, because of the expertise of the panel of SME's who define and maintain the BoK.

An example of a BoK is provided by the American Society for Quality (ASQ) for its' Certified Reliability Engineer (CRE) program. [14] The CRE exam is developed according to Blooms Taxonomy [15] for the required levels of cognition to be demonstrated for the subject domain. For those unfamiliar with Bloom's groundbreaking taxonomy, it is the division of learning into three domains:

1. the cognitive - knowledge based domain at 6 levels
2. the affective - attitudinal based domain at 5 levels
3. the psychomotor - skills based domain at 6 levels.

Defining the minimum and maximum level of cognition at which a subject must be taught and tested is a complex and challenging process. Mary Forehand revisits Blooms Taxonomy to describe how his original taxonomy of learning levels can be used for developing a BoK. [16] This ensures the challenge level of a certification exam is neither too simple, i.e. tests only lower level knowledge based on recall and rote memorization, nor too difficult, i.e. testing based on inventing new information from abstract theoretical concepts. In general, most personnel certification programs test at the level associated with applying knowledge correctly, and problem solving. Once developed, the BoK must be updated at regular intervals by a panel of SME's. The underlying reasons and the process for this must be understood and respected so that personnel certification remains valid, relevant and fair to everyone involved in any way with the program.

3. Standards and Guidelines referenced

Many standards are available to describe the requirements, guidelines or policies for personnel certification schemes. At the international level, the Committee on Conformity Assessment (CASCO) provides terms, definitions and general requirements for certification programs. [17] The International Standards Organization (ISO) in 2003 released a new standard, ISO/IEC 17024, Conformity assessment - General requirements for bodies operating certification of persons. As described at the time by Dr. Thomas Facklam, the Chairman of the International Accreditation Forum (IAF) and convener of the working group that developed the new standard. *"It provides a uniform set of guidelines for organizations managing the qualifications and certification of persons, including procedures for the development and maintenance of a certification scheme. It is designed to help bodies operating certification of persons conduct well-planned and structured evaluations using objective criteria for competence and grading in order to ensure impartiality of operations and reduce any conflict of interest."* [18]

The ISO standard 9000 for quality management systems is also useful and applicable to personnel certification programs, because ISO 17024 identifies the need to use a Quality Management System (QMS), or similar system. The ISO 9000 standard for QMS's requires employees to receive appropriate training, and for employers to document and measure the effectiveness of the training. Personnel certification programs are a very effective way to satisfy that requirement.

Apart from the standards that are directly applicable to personnel certification programs, many others have been developed for specific occupational areas. They may be international, national or regional in scope, and overlap with or reference other standards developed for specific industries. Like personnel certification programs, standards are often developed in response to a request from industry. For example, the Society of Automotive Engineers (SAE) developed the SAE Standards JA1011 [19] and JA1012 [20] for Reliability-Centered Maintenance (RCM). These are intended for use by any organization that operates physical assets or systems that it wishes to manage and maintain responsibly by using an acceptable RCM methodology. As another example, the American Petroleum Institute (API) publishes a host of equipment and practice standards for the petroleum and petrochemical processing industries. Standards from technical organizations often contain important information pertaining to personnel certification, and for both of the above examples, certification schemes are in place for RCM practitioners and API inspectors.

Standard developing organizations play an important role in guiding the development and growth of personnel certification programs by bringing technical advances in the subject domain, as well as advances in the field of education, training and testing to the attention of personnel certification bodies. Those engaged in personnel

certification activities should use standards judiciously. The information and advice provided by a good standard should never be ignored. However, if a standard was developed for a technical context that no longer exists, then it may no longer serve the purpose for which it was originally intended. Rigidly adhering to a standard that is out of synch with current needs and demands will keep a personnel certification program stuck in the past. Fortunately, most standards development organization have mechanisms for updating standards, albeit sometimes very slowly or with great difficulty. Neither should the use of standards be overly rigid, as that could handicap the people operating or using the personnel certification program by preventing them from making sensible use of up to date information and best practices. For example, ISO standards are updated and revised on a 5 year cycle, and this may be too long a period to wait to make changes that make sense.

Therefore as a minimum it is recommended to acknowledge applicable standards and adopt them wherever it makes sense to do so. This can be done within a personnel certification scheme by identifying a standard as a normative or information reference, and following it accordingly. Doing so demonstrates that the certification program is keeping up to date by paying attention to current information.

4. Psychometric analysis of test forms and test items

"Archaeologic research has shown that more than 1,000 years ago examinations were administered for the licensing of physicians in China. Examinations were available to license physicians in the Middle East a few hundred years later. As Western culture took time to grow out of the Middle Ages, testing also became a means of issuing licenses for physicians. Thus, there is a long history to our current enterprise of testing for competence in the health fields." [21]

In the last 1000 years, the science of measuring knowledge, skill and competency has advanced as fast and as far as any other technical discipline. The specific field of study dedicated to understanding and improving the testing process is called psychometric analysis. Some of the reasons psychometrics emerged are: 1) a desire to improve the reliability of a test as a measuring instrument, 2) being better able to define standards to help advance a profession, and 3) to improve the defensibility of personnel certification bodies and certification processes.

As an example, psychometric analysis improves the accuracy of multiple-choice question formats on high volume screening tests such as university entrance exams. Exams using only multiple-choice questions can be a very inaccurate test of knowledge and therefore unfair to the test candidate. Essay style tests can be very subjective to grade. And other question types such as True/False or Yes/No offer the candidate a 50% successful guess rate. No matter what type of question format was used, testing error exists. [22] Therefore the need for better accuracy and fairness in standardized testing emerged in the 19th century. Eric Haughton criticized terms such as "knows," "understands," or "is able" because they do not delineate learning well. [23] Therefore the testing of knowledge and skill has become a specialized technical discipline with statistical tools provided by psychometric analysis. As described by Marvin Trimm, "*In the US, The American National Standards Institute's ANSI-PCAC-GI-502,* Guidance on Psychometric Requirements for ANSI Accreditation, *was developed to provide guidance about compliance with ISO/IEC 17024 Conformity Assessment - General Requirements for Bodies Operating Certification of Persons to certification bodies interested in ANSI accreditation. It does not prescribe specific statistics that should be computed and displayed. Rather, it emphasizes* ***methodologies, procedures, types of analyses, and how they are applied,*** *as a basis for the accreditation standards in ISO/IEC 17024".* [24] Through tools and techniques such as the Angoff method for cut-score workshops, the performance of test forms and items as measuring systems can be refined and improved. [25, 26, 27, 28] For example, the American Society for Nondestructive Testing (ASNT) publishes *"Guidelines for the development of Test Questions for NDT exams"* [29], a very useful primer with best practices for developing test forms and test items. Some psychometric analysis tools are available at no cost on the Internet. [30, 31] Statistics such as the point biserial measure the ability of test items to discriminate equitably between those who know and those who do not know. Psychometric analysis guards against types of errors such as passing and accepting candidates who are ignorant and incompetent and who should not pass, or failing a knowledgeable and competent candidate who should pass the certification test.

There are other reasons to use statistically based tests developed using psychometric analysis. For example, if someone sues a personnel certification body for being denied employment because they are lacking a certification they repeatedly failed, or if an employer denies someone advancement because of a failed certification effort, then the psychometric analysis can be introduced by counsel to help prove the technical soundness of the test. Another very good use of psychometric analysis is to correlate the performance of test forms and test items as they are translated into other languages. This is useful whenever personnel certification bodies address cultural diversity and promote their certification programs around the world. The psychometric analysis of the same test forms and test items that are translated into different languages ensures that multilingual candidates do not have access to a certification test form in one language that is easier to pass than a test form in another language.

The author suspects that a gold mine of information lies within the mountain of test data accumulated by personnel certification bodies over the past several decades. Analysis of the data using the analysis techniques and software tools available today would yield useful information; providing great insight relevant to certification in terms of what people learned and can do, versus what they should have really learned and should know how to do.

5. Preparation and training

The path to higher knowledge through learning proceeds in distinct phases. The first and often most problematic is "not knowing what you don't know". This gap in knowledge is often unseen and totally transparent to people. Once aware of that gap though, then the pursuit of education, training, practice and experience can begin to fill it. However, just knowing some facts and concepts and witnessing demonstrations is not enough; you need to be able to do something with them! Therefore further education and on-the-job experience leads to the correct application of skills and knowledge to useful activities and that is a function of accumulated useful experience over time. As they become embedded in the brain, mastery can be demonstrated at the higher levels of analysis and problem solving in the cognitive, affective and psychomotor domains.

Formal academic education provides a measure of a person's ability to demonstrate knowledge at a certain point in time. Evidence in the form of a college diplomas or university degree is proof that a person was capable of meeting a learning requirement for a subject domain at a certain cognitive level at a given point n time. In short, it means a person knows how to learn. Once gained, keeping knowledge and skills current and up to date is not easy. Huge changes have occurred within education systems in terms of 1) the amount and type information to be delivered, 2) the learning environment it is delivered in, and 3) the delivery methods used, and the student on the receiving end who is doing the learning. Long gone is the era of the one-room schoolhouse where a teacher wrote lessons on a chalk blackboard for the three R's of **R**eading, W**r**iting and A**r**ithmetic to a class with students from grades 1 to 8 in it. Today, those entrusted to educate the people who will be the workforce of tomorrow have different demands and multiple roles to play that are more complex and multi-dimensional. Significant insight to this has been provided by Eric Haughton, who found that teachers and other professionals in education can take advantage of the visual, auditory or kinesthetic "learning channels" to avoid vague descriptions of learning behavior and their outcomes. [23] Researchers have proven that education and training should relate to a person's experiential world, and be designed to use the learning channel that is inherently best suited for them.

In the world of adult education, the four most common sources of failure in adult learning are content overload, content mismatch, memory loss and learning style mismatch. Therefore a training needs analysis must be used for the design and delivery of information to the adult learner. Learning-centered instructional design should follow a process of design and prototyping to meet specific learning parameters. A variety of assessments can be used to identify the context, content, user needs, and work or job parameters. This is followed by evaluating training suitability and a cost-benefit analysis. The result should be education and training that instills the correct knowledge, skills and competencies for targeted training outcomes. No training or certification program can declare itself a success until the student validates that new knowledge and skills were gained and transferred to the job to the benefit of themselves, their employer and their customers. As an example, to ensure that Instructor skills are commensurate with the design and delivery of training, the Canadian Society for Training and Development (CSTD) provides two certification programs for people to demonstrate a thorough understanding of the training profession. The Certified Training and Development Professional (CTDP) and the Certified Training Practitioner (CTP) are based on the competency categories in the Training Competency Architecture, commonly called the 'TCA", a common body of knowledge for the training and development profession. [32]

6. Surveillance and renewal

Initial and ongoing surveillance of people seeking and maintaining certification is necessary to ensure they represent themselves honestly, and remain engaged in their occupational field. Applications should be statistically sampled and the information checked for completeness and accuracy. Subsequent to the initial application and assuming successful certification, ongoing renewal is needed to update the history of employment and work experience. This is needed because periods of significant interruption will erode important skills and competencies through memory leakage and lack of practice. So the renewal should serve to remind people that they need to keep active and engaged in their chosen profession. This best practice links to the next best practice of recertification.

7. Recertification

Academic achievement is proof of what was achieved once, and that becomes part of the past. A best practice for a personnel certification program is to measure skills and competencies that need to be maintained over a continuum of time. It provides proof of current knowledge and skills to be demonstrated today. Recertification will be necessary whenever advances are made or new technology relevant to the certification becomes available. The practice of requiring evidence of continued competence to retain certification is an important part of a well-designed certification program. The requirements should be reasonable and appropriate, such as collecting Continuing Education Units (CEU's) or proving ongoing technical engagement in other ways such as authoring articles, developing curriculum and delivering training, conducting and publishing research, or serving on panels as a SME for a BoK.

The argument for recertification also has to do with the fact that to perform at a consistently high level, people need continuous reinforcement and repetition to drive knowledge into long-term memory, and fluidly connect it with muscle memory and eye-hand coordination. People in every field of human endeavor including the performing arts, professional sports, civil aviation, aerospace, all branches of the military, and many technical occupations rely on the expertise gained through practice and repetition. For example, hockey great Guy Lafleur of the Montreal

Canadiens NHL hockey team was famous for spending extra time skating alone and shooting pucks to learn and improve every nuance of his shooting and passing. The military submits recruits to exhausting simulated combat operations to condition them to automatically and properly respond under the stress of battlefield conditions. And the National Aerospace Agency (NASA) subjects astronauts to hours of rigorous operational drills to ensure they will perform reliably under the stress of working in outer space. An interview with famed musician Ray Charles illustrates the connection between practice time and performing at a high level:

ROBERT SIEGEL: You practice a lot?
RAY CHARLES: Whenever I can. I don't -- I don't practice as much as I would like to, because I'm not around a big piano all the time. But I try to, you know, I try to practice a little bit every day for the most part.
ROBERT SIEGEL: And when you practice, I mean, do you practice the tunes that you'll be playing at the next concerts.....?
RAY CHARLES: Oh, no, no, no, no, no, no, no, no, no.....
ROBERT SIEGEL: I guess the answer is no, you're saying?
RAY CHARLES: No. No. I practice things like scales and chords and movement of my hands and things like that, because, I mean, I -- what I'm going to play on stage, I know. What I'm practicing for is to try to improve what I might play, you know. You gotta practice. I mean you gotta keep your fingers loose, you gotta keep your mind active, you know, because what your mind think of -- the question is: what your mind thinks of, can your fingers play it?
ROBERT SIEGEL: Right. [33]

Put in simple terms, practice makes perfect, and repetition is the key to keeping essential skills finely honed.

Authors Repenning and Sterman also provide a compelling reason for maintaining and upgrading competencies and skills: *"The bias towards blaming people rather than the system within which those people are embedded means managers are prone to push their organizations into the capability trap."* [33] They assert that a "capability trap" occurs when organizations choose to work harder using the same old time-worn approaches as have always been used, instead of looking for ways to improve the way work gets done, i.e., work smarter. Beyond that, they also maintain it is necessary to improve the system that manages resources and work as a whole. Personal improvement cannot be ignored and management cannot excuse themselves or their organizations from seeking out best practices in the interest of continuous improvement.

Figures Three, Four and Five illustrate the differences between what Repenning and Sterman describe as the "Physics of Improvement" and the two ways in which improvement is sought and implemented: Work Harder versus Reinvestment / Reinforcement.

Figure Three - *The "Physics" of Improvement*

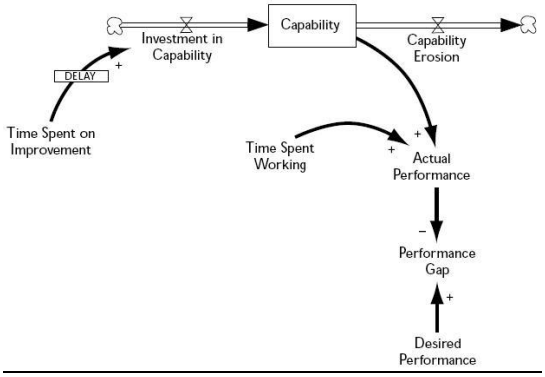


Figure Four - *The Work Harder Balancing Loop*

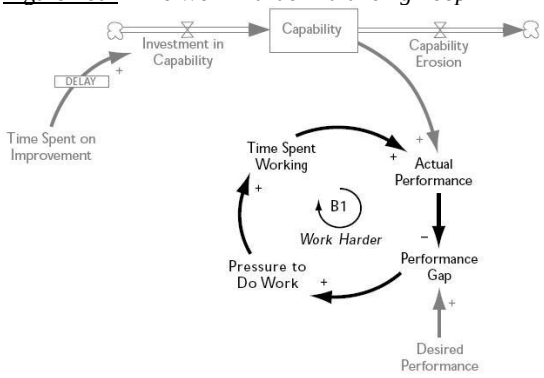
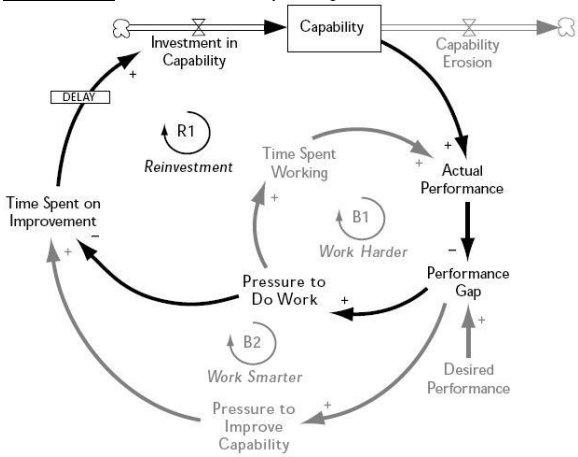


Figure Five – *Reinvestment for Improvement*



Note that Reinvestment / Reinforcement in Figure Five simultaneously uses the Work Harder, Work Smarter and Reinvestment (improvement) mechanisms to close the gap between desired and actual performance. Put in terms of personnel recertification, working harder using skills and competencies as tested by the original certification

requirements is not as good as learning to additionally work smarter by taking advantage of new knowledge or technology. Better still is to also improve at the same time the fundamental process for how something is done. Recertification assures that the original capabilities are maintained, while further enhancing and updating skills through lifelong learning and development. This requires a reinvestment of time and money on an ongoing basis, but as previously noted in the business case for certification, the waste and risk of failure associated with the loss of knowledge and erosion of essential skills should generate an acceptable ROI for personnel recertification.

8. Program accreditation

A personnel certification body inspects the credentials of candidates and through testing, makes decisions about whether they will be certified. To do so in the best way possible, a Quality Management System (QMS) is needed to deliver products, services and information that reflect the "Voice of the Customer" at a level that inspires customer confidence and loyalty. But who decides whether the QMS is adequate, if in fact one is present at all?

Conformity assessment is the practice of determining whether a product, service or system meets the requirements of a particular standard. The International Accreditation Forum is the world association of Conformity Assessment Accreditation Bodies in the fields of management systems, products, services, personnel and other similar programs of conformity assessment. [35] Program accreditation is an excellent way to ensure that a QMS approach is intrinsic to the management of a personnel certification program. Organizations such as the Standards Council of Canada (SCC) accredit conformity assessment bodies in areas such as testing and calibration laboratories, greenhouse gas verification and validation bodies, management systems certification bodies, personnel certification bodies, product and service certification bodies and inspection bodies. [36] In the same way that most countries have a standards developing body, they can also have an accreditation agency. For example, the SCC in Canada, the American National Standards Institute (ANSI) in the United States [37], and the United Kingdom Accreditation Service (UKAS) in Britain [38] provide accreditation to specific standards. Those and other agencies like them provide accreditation in a variety of diverse technical occupations. For example, the Canadian Association for Co-operative Education (CAfCE) develops resources to promote the highest quality of co-op education programs in Canada. It does this through a national forum of professional co-op practitioners; by establishing national standards and promoting the value of post-secondary Co-operative Education; and by delivering opportunities for learning and sharing of best practices. The CAfCE also provides co-op program accreditation services for co-op education programs, and lists over 80 accredited educational institutions. [39]

Accreditation should establish whether the QMS meets the requirement of *"Say what you do, do what you say, prove it and then improve it."* If it does, then the QMS will contribute to the long-term sustainability of the certification program and the customers using the certification. As an example, Appendix One contains a form that could be used to evaluate a personnel certification program against the requirements of ISO standard 17024.

Summary

The background relating to personnel certification has been reviewed, along with some best practices for developing and maintaining a high performing personnel certification process. It should be obvious that education and training, along with the science of measuring knowledge and testing competency, is now much more sophisticated than it used to be. In the occupational areas where certification is offered and used, it is up to business leaders and decision-makers to be aware of the best practices for personnel certification programs, and much more importantly, to be willing to use them to maintain and improve personnel certification schemes.

When all is said and done, a best practices approach is applicable to just about anything worth doing. Pursuing an approach based on best practices is a test of our determination to learn to do the right things, and to do them well.

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APPENDIX

Section 4 – Requirements for Certification Bodies

4.1 Certification Body Requirements	**Overall Assessment**	**Recommendations**
4.1.1 *Fair and equitable policy and procedures for all candidates.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.1.2 *Defined policy and procedures for granting, maintaining, renewing expanding, reducing scope, suspending and withdrawing of certification*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.1.3 *Certification body confines requirements, evaluation and decision on certification to matters relating to scope of the desired certification.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.2 Organizational Structure Requirements	**Overall Assessment**	**Recommendations**
4.2.1 *Structured to give confidence to interested parties in its competence, impartiality and integrity.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.2.2 *Documented structure to safeguard impartiality, with provisions to assure impartiality of operations.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.2.3 *Appointment of a scheme committee(s) for the development and maintenance of the certification scheme.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.2.4 *Certification body requirements regarding financial resources, confidentiality, objectivity and impartiality*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.2.5 *Certification body shall not offer training or aid others, with demonstration of how training is independent of evaluation.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.2.6 *Certification body policies and procedures for the resolution of appeals and complaints.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.2 Organizational Structure Requirements	Overall Assessment	Recommendations
4.2.7 *Education, training, technical knowledge and experience of certification body personnel, including contracts.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.3 Development & Maintenance Requirements	Overall Assessment	Recommendations
4.3.1 *Definition of the methods and mechanisms to be used to evaluate competence of candidates.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.3.2 *Review and validation of changes by scheme committee members for any change in requirements for certification*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.3.3 *Notice to certified persons of any change in requirements for certification.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.3.4 *Criteria for competence defined by certification body against ISO 17024 and other relevant documents as developed by experts and endorsed by the scheme committee.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.3.5 *Certification not restricted on grounds of undue financial or other limiting condition.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	
4.3.6 *Evaluation of the methods for examination of candidates for reliability, with annual review.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.4 Management System requirements	Overall Assessment	Recommendations
4.4.1 *Management of the certification body is documented and covers all aspects to ensure effective application of the standard.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.4.2 *Establishment and implementation of a management system that is understood at levels of the organization.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.4 Management System requirements	Overall Assessment	Recommendations
4.4.3 *Document control, audit and management review systems are in place.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.5 Subcontracting requirements	Overall Assessment	Recommendations
4.5.1 *Development and documentation of agreement(s) with subcontractors.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.5.2 Certification body responsibility for assessing subcontracted work per documented procedures.	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.6 Records requirements	Overall Assessment	Recommendations
4.6.1 *Certification body to maintain a record system for certificant status, forms, evaluation, surveillance and compliance to regulations.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
4.6.2 *Records identification, management and disposal.*	☐ **Fully meets standard** ☐ **Partially meets standard** ☐ **Does not meet standard**	

4.7 Confidentiality requirements	Overall Assessment	Recommendations
4.7 *Certification body to maintain confidentiality of Information obtained.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

4.8 Security requirements	Overall Assessment	Recommendations
4.8 *Security of exams maintained by certification body and subcontractors in a secure environment to maintain confidentiality.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

Section 5 – Requirements for Persons employed or Contracted by certification body

5.1 Personnel requirements	Overall Assessment	Recommendations
5.1.1 *Certification process defines the personnel competence requirement.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
5.1.2 *Certification body personnel commitment to the rules and independence from commercial interests.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
5.1.3 *Certification body documents experience, education, technical expertise, duties and responsibilities of personnel.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
5.1.4 *Certification body maintains documentation on the relevant qualifications of personnel.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

5.2 Examiner requirements	Overall Assessment	Recommendations
5.2.1 *Requirements of Examiners based on applicable competence standards.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
5.2.2 *Recorded measures to ensure Examiner conflict of Interest does not compromise certification process.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

Section 6 – Certification Process

6.1 Application requirements	Overall Assessment	Recommendations
6.1.1 *Description of certification process.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.1.2 *Application for individuals seeking certification.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	

6.2 Evaluation requirements	Overall Assessment	Recommendations
6.2.1 *Application review for ability to meet requirements*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.2.2 *Competence examined by written, oral, practical, observational or other means*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.2.3 *Examination structure covers scheme objectively and systematically.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.2.4 *Reporting procedures to document performance and results.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	

6.3 Decision on Certification requirements	Overall Assessment	Recommendations
6.3.1 Certification decision not awarded by anyone involved in the examination or training of candidates.	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.3.2 *Certificate awarded for sole ownership.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	
6.3.3 *Certificate information to meet minimum requirements.*	☐ Fully meets standard ☐ Only partially meets standard ☐ Does not meet standard	

6.4 Surveillance requirements	Overall Assessment	Recommendations

6.4 Surveillance requirements	Overall Assessment	Recommendations
6.4.1 *Proactive surveillance process used to monitor compliance with provisions.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
6.4.2 *Procedures and conditions in place for maintenance of certification according to the scheme.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

6.5 Recertification requirements	Overall Assessment	Recommendations
6.5.1 *Certification body defines recertification requirements according to the competence standard.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
6.5.2 *Procedures and conditions for recertification include frequency and content as endorsed by the scheme committee.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

6.6 Use of certificates and logos / marks requirements	Overall Assessment	Recommendations
6.6.1 *Certification body provides certification mark or logo and documents conditions for use.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
6.6.2 *Certification body requires certified persons to sign an agreement to comply with certification scheme and provisions for use.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	
6.6.3 *Certification body applies corrective measures for nappropriate or misleading use of certification logos or marks.*	☐ **Fully meets standard** ☐ **Only partially meets standard** ☐ **Does not meet standard**	

Informative Aspects for the development and maintenance of a personnel certification scheme

A.1 Certification schemes for persons should only be established in response to specific government requirements (i.e. protection of the public) or a demonstrated market need / desire. (i.e. credibility, confidence and improvement of the profession)

A.2 The certification body or organization proposing the certification scheme should consult the interested parties on the following:

a) a description of the field for which the persons will be certified;

b) a description of the qualification/competence requirements, evaluation requirements and procedures, including those for surveillance and recertification;

c) the degree of support for the scheme by the interested parties and evidence of their acceptance of the contents of the scheme;

d) which organization should be responsible for the development of the proposed scheme.

A.3 A job / practice analysis should be conducted periodically (at least every 5 years) to produce or confirm the following:

a) a description of the target candidate population and a statement of purpose or intended outcome for certification;

b) a list of the important and critical tasks performed by competent people working in the profession;

c) a list of the certification requirements, including the rationale and evaluation mechanism(s) selected for each requirement.

d) a specification for the construction of the examination(s), where a formal oral or written examination forms part of the evaluation process. Including content outline., types) of questions being posed, cognitive level(s) of the questions, number of questions for each subject, time length of the examination, method for establishing the acceptance level of the mark, and methods9) for marking;

e) a specification for the construction of the examination(s), where a formal oral or written examination forms part of the evaluation process. Including content outline., type9s) of questions being posed, cognitive level(s) of the questions, number of questions for each subject, time length of the examination, method for establishing the acceptance level of the mark, and methods for marking.

A.4 All mechanisms should be prepared by persons who are thoroughly familiar with the certification profession and the relevant subject matter, and are skilled at preparing such mechanisms.

A.5 All examinations should conform to the examination specification, ensure a uniform application, and be free from bias.

A.6 The certification body should define the controls for rotation of examination or revision in order to maintain their objectivity and confidentiality.