



Take Back Manufacturing

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Draft Proposal

“Integrated Industrial Learning System”

(Technical and Technical Management Training Proposal)

For

Ontario CANADA

Prepared by the TBM Forum

Education and Training Group

May 25, 2014

This Proposal Details the Vision of an “[Integrated Industrial Learning System](#)” As Outlined By the **Take Back Manufacturing (TBM) Forum**

TBM is an initiative dedicated to the restoration of our manufacturing sectors to achieve a more balanced economy and an improvement in the associated prosperity within Ontario and Canada

For more on the **TBM** initiative, go to: www.sme-tbm.org

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Preface:

Our Vision is to Provide Ontario a World Class Apprenticeship and Technical Training Progression that Leads Ontarians into Rewarding Lifelong Employment and Prosperity

We outline this vision and framework for an “**Integrated Industrial Learning System**”.

This training system will provide a complete learning system of education, training and industrial experience.

The system will engage both young and mature students and propel them through an integrated career journey that will place them into an apprenticeship with progressive companies to create trade, technical, engineering and management careers.

The system will be an integrated and scalable apprenticeship program of academic and technical education, along with workplace experience and skills that delivers the necessary workforce desired by industry.

Only through the shared support and participation of our industry, our education and training institutions, and the 2 levels of government, will this program be economically viable and mission sustainable. (Appendix I)

It will require a fresh look at how we view our current learning environments and unfettered visioning and planning to undertake such a change.

All current education and training providers, professions and professional regulators, industry and industry associations and government agencies and ministries are invited to participate and share in the organization, development and growth of this apprenticeship system.

We look forward to support from all involved for the future of our industries, our children, our citizens, and our province.

Take Back Manufacturing Forum

The Integrated Industrial Learning System

The Take Back Manufacturing Forum created this proposal, ***The Integrated Industrial Learning System.***

This new system allows Industry to create, own and operate a training program that fully trains and qualifies technical and business professionals to fill real Industry workforce requirements now!

It works because it is *owned* by **industry**, *coordinated* by **government** and *supported* by **education**.

As you know, the current education process does not always provide the qualified and experienced employees, Industry requires. With scarce time and funding, Industry still has to follow with on-the-job training, before employees become fully qualified to practice and perform.

Our proposal, our solution, is a new approach to early and actively set a course, for young and mature career entrants, to secure their industry profession through on-the-job training and experience and off-the-job business and technical education.

This approach succeeds when industry provides real skills-competency profiles and real-time labour requirements into an industry owned and operated program of industry training and education. Funding and capital resources are provided and shared between employer and employee (sponsor) as well as government and education institutions.

Our TBM Integrated Industrial Learning System provides the industry guidance to develop industry programs that create ***the Needed Industry Skills for the Jobs Industry Needs!!***

This TBM proposal is freely available to you for your review and comment. We look forward to having a discussion and enlist your industry support.

Introduction

The Take Back Manufacturing (TBM) initiative is dedicated to raising awareness for the restoration of our manufacturing sectors, to achieve a more balanced economy and an improvement in the associated prosperity within Ontario and Canada.

One of the TBM imperatives is the availability of a future manufacturing workforce that is well-educated, well-trained, experienced and ready for work.

The manufacturing workforce has suffered a decline in concert with the decline of the manufacturing sectors and has now placed the current skill mix in disarray.

Without significant and structured re-planning and action we will experience a drastic and increasing shortage of workforce experience, knowledge and skills in most manufacturing sectors.

Manufacturing is unique in that it requires a large pool of talent that is well educated, and highly trained in technology and industry technique. ***Training and talent is a highly perishable asset***, as technology changes very rapidly, and the pace of change will only continue to accelerate. Many skills, competencies and abilities learned today require relearning and upgrading to meet new industry requirements that often emerge in less than five years time.

To combat this workforce shortage, (and skills shortage) we outline a vision and framework for an **“Integrated Industrial Learning System”** that will coordinate and integrate all learning activities to create the correct balance of education, training and industrial experience and provide a focus to create a highly knowledgeable, skilled, competent, and experienced workforce across all levels and disciplines within each industrial sector.

We will explain how this System is installed by one body for joint industry education and training, engaging students, either in school or from the workforce, propelling them through an integrated career journey that places them into an integrated apprenticeship with progressive companies to create trade, technical, engineering and management careers. It will be scalable across all trade, technical and professional grades with solid and efficient career pathways.

This **“Integrated Industrial Learning System”** is essential to re-invest in our most valuable manufacturing resource, our workforce, so we create a future environment that reinvigorates our businesses so they may compete and thrive. This in turn will generate prosperity via stable careers with higher incomes, and provide our governments with higher tax revenues and surplus budgets to further invest in our future economy and in general spur continued growth in manufacturing and business.

The Current Situation

“The Conference Board of Canada estimates that skills gaps cost the Ontario economy up to \$24.3 billion in forgone GDP – as well a \$4.4 billion in federal tax revenues and \$3.7 billion in provincial tax revenues – annually.”

Reports exist of current and future workforce shortages in the manufacturing sectors. They report outlooks of significant and continuing shortfalls in Ontario youth employment. They also report current and projected data that show our new Ontario professionals being unable to follow their chosen careers due to job ready experience gaps. The prediction is that this industrial sector workforce experience gap and employment skill mismatch will widen as the baby boomer generation, representing a significant and aging portion of the manufacturing workforce, will soon exit. Therefore, we see an ongoing and significantly rising demand for skills and experience and an equally rising level of an unemployable younger population.

This looming nationwide skills shortage and mismatch in our declining industrial sectors, is a “going out of business plan” which will have dire consequences for our local economies and our individual prosperityTBM Forum

It is not a work force people shortage, but a growing skills shortage due to a lack of a systematic plan for training to the occupation standards and criteria that industry requires.

Because of global, transnational operating environments, Ontario businesses have to operate in an unfriendly arena which some call “destructive competition,” which our current government policies or lack of policies enable. This places our industry in the mode of taking skilled workers away from their competitors/non competitors with no one willing or encouraged to spend to train new workers. As a result, we are seeing declining company individual apprenticeships, internships, etc and declining programs and funding.

Ontario Society of Professional Engineers provided the following observations of the current industry operating environment: (Paul Acchione, President of OSPE)

1. “The current industry training paradigm:
 - a. Companies have gotten out of the training and development business and want government to supply them with workers that exactly fit their needs at the government or individual's expense.

Integrated Industrial Learning System for Ontario

- b. Vacant jobs go unfilled and people are left underemployed or unemployed as a result
 - c. We are graduating far more college and university level people than the economy can absorb, even if some day we solve the problem in (b) above, by a large margin and the annual accumulation of underemployed people continues to grow.
 - d. Once people are underemployed for 2 to at most 5 years employers will no longer accept even their completed degrees. It's the same as if these people never went to college or university. In other words a college or university degree in the applied sciences has a shelf life if you don't use it.
2. We need to better differentiate the unique problems between trades that have exclusive right to practice and technicians, technologists and engineers who do **not** have an exclusive right to practice in their profession. Also there is a difference between a right to title and the right to practice.
 3. The majority of college and university graduates from technical programs in applied science are practicing legally without a license or certificate. This means that in most cases it's not the lack of a license or certificate that is the problem to get work, it's the employer that doesn't recognize what the individual has to offer and won't put in the time and money to train them.”

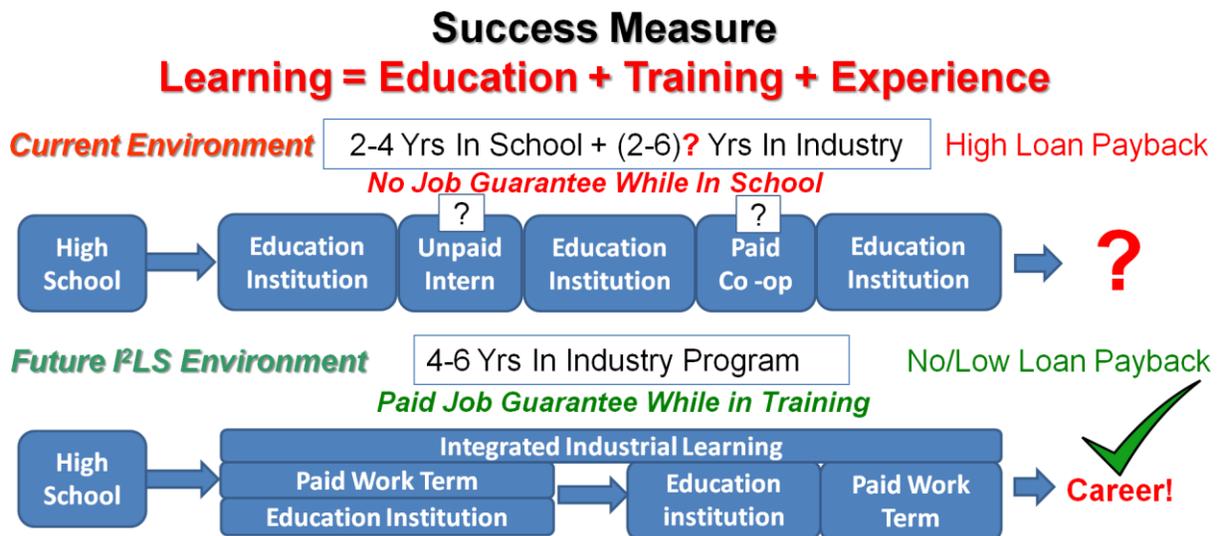
There are currently many types of fragmented and inadequate programs available in Ontario to recruit, train and retrain our industrial workforce. Structured work experience programs include; co-ops, internships, mandatory professional practice, and field experience. Institutional practice programs include applied research projects and service learning. These programs offer varying degrees of exposure and experience in a work environment with the mentorship of institution or industry professionals. Most of these programs are targeting specific/specialized occupation training and/or solving specific problems and do not generate an integrated and effective industrial learning environment that will be able to support the need into the future. *(See Appendix II)*

Most of the workforce training however occurs through college and university programs following a North American model that are an “arms length” approach from employers. The programs are meant to produce flexible and self reliant people who the employers can then further train and match their skills for specific jobs. This is at high cost and sometimes at high risk for the individuals signing up for the education, and at low cost and low risk for the businesses receiving these graduates. (The actual total cost and duration of an individual’s education and training using this path is variable and undetermined)

The following are the results of an Ontario University Council Study of the 90% engineering graduates that say they want a job in engineering: (Graduate study taken after 2 years in the workplace)

- 34% go into engineering
- 50% go into other university level jobs (OSPE is conducting research to see what percentage of these jobs are technical/scientific and non-technical)
- 10% go into lower skill jobs
- 6% are still unemployed

For those engineering students that get engineering jobs, many, if not most need to continue with industry training to have enough knowledge and skill to perform their professional responsibilities. In some industries such as power and nuclear, engineers receive 2 to 6 more years of training before they can be considered fully qualified to work in their field of discipline.



Canada and Canadian Industry is more dependent on the public education system to train and educate industry professionals than is found in Central Europe. On the other hand, Northern European countries, namely Germany, Austria, and Switzerland, have recovered from recession and continue to enjoy a manufacturing GDP similar to their 2008 numbers, with country trade surpluses.

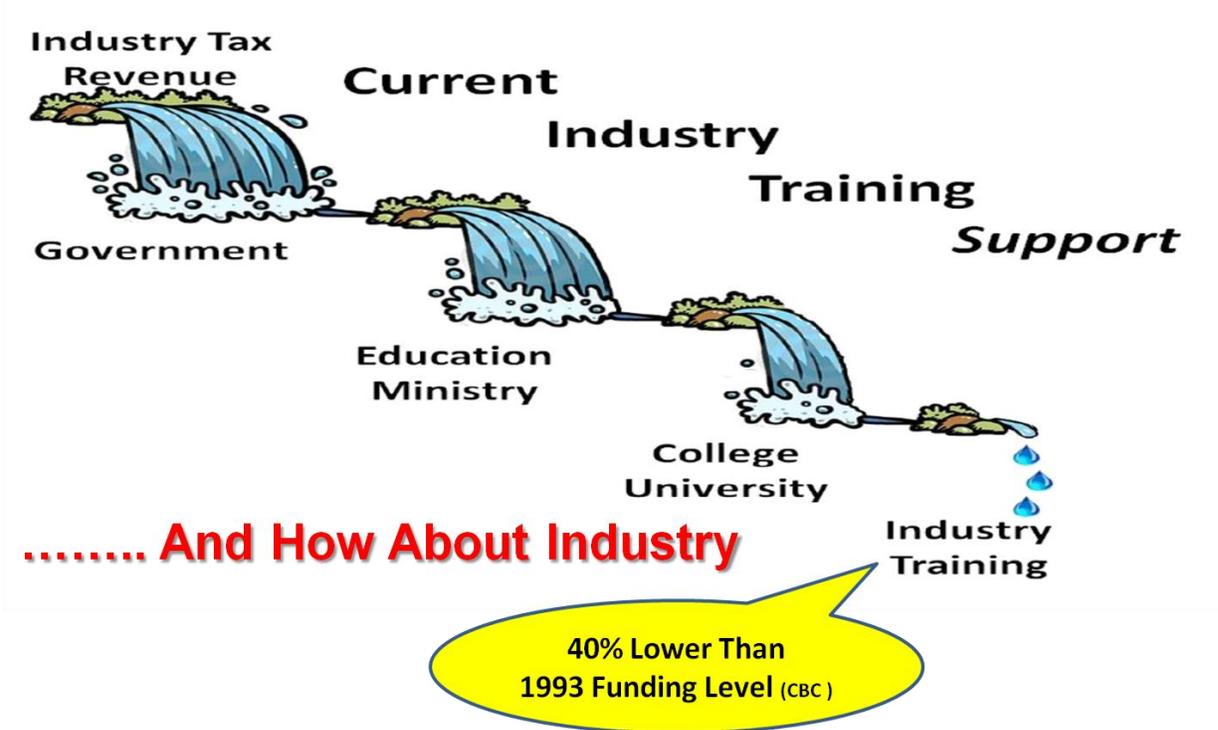
Innovative emerging economies, such as Ireland are successfully developing new approaches to education and training. Mature economies such as the UK are revisiting and rebuilding the strong and successful apprenticeship systems they had operating very effectively Post WW2 and prior to the 1980s. The UK recently rolled out their new program this past October 2013. (See Appendix III)

A **key reason** for their economic success is that each of these countries has strong government coordinated and well integrated apprenticeship programs for industry based education and training of technical, engineering, business and management professionals.

Our analysis, when we compare the Canadian (Ontario) system to these past and present benchmark European systems, is that the Canadian education and training environment supporting our manufacturing sectors, is underfunded, poorly integrated and mainly ineffective. It continues to operate in silos across trade/technical and professional grades and suffers considerably from a poor linkage and organization of standards of performance between academic education and industry training and industrial experience activities.

The current training process is mainly an educator supply driven program approach and not an industry demand driven outcomes assessed approach. Consequently, an imbalance of funding is applied to education developed programs with little funding applied to outcomes based industry initiatives. This lack of support may be a key reason for the continuing decline in Industry funded, education supported training to 40% of the training fund levels in the 1990's.

Current Public Funding Flow.....



Post WW2 Canadian Industry, via a strong immigration policy, utilized well-educated and trained technical professionals from Great Britain and Central Europe. They were the major contributors to creating the manufacturing economy and prosperity we enjoy today.

It is highly unlikely that we will be able to adopt that strategy again. Our current restrictive Canadian immigration policy which quite correctly restricts immigration due to our significantly high national underemployment levels means we must look toward our own national apprenticeship system to better utilize our significantly under-employed citizens to rebuild our future workforce.

The Canadian Industrial technical workforce is loosely divided into 3 main grades for the technical trades:

**Professional Engineers,
Technicians and Technologists,
and the Skilled Trades.**

We reviewed how each of these operates against the global benchmark....

The Skilled Trades

With Ontario skilled trades there is a direct link to industry through the provincial trades' apprenticeship program. Currently, there are many more trades people working in industry, than are industry technicians, technologists, and engineers combined. We believe that the industry need for skilled trade persons will continue to grow in the future along with the need for new and more advanced skilled trades as industry increasingly employs more high technology, high efficiency manufacturing tools and methods.

The industry skilled trades apprenticeship program(s) for compulsory and non-compulsory trades training has had a long history of success in Ontario and today provides occupations that pay above average incomes to our workforce. Those workers securing a Certificate of Qualification, for a National Red Seal trade, are able to practice in any province outside of Quebec. However, not all industry trades workers in non-compulsory trades have a C of Q.

The newly formed Ontario College of Trades (January 2012) is now the provincial skilled trade regulator. Of the 54 industrial trades listed with OCT, seven are Red Seal compulsory trades.

The OCT is working with industry, unions and educators to set training and certification standards that serve the skilled trades sector and the public interest.

The Ministry of Training, Colleges and Universities, since 1920, continues to govern finance, operate and manage the provincial apprenticeship training program(s). (Recently, MTCU gave its regulator responsibility to the Ontario College of Trades)

A Colleges Ontario study* of our provincial apprenticeship system noted “Ontario is not producing the certified tradespersons it needs for growth”:

- High percentage of apprentices fail to complete at-work training
- Large dropout rate with only 53% completion of Certificate of Qualification
- Low representation from women and under-represented groups
- Apprenticeship system not designed for laddering to other post secondary education programs
- Ontario’s in-school training programs are shorter than other provinces
- Ontario is second lowest interprovincial exams pass rate

Also, in the same report, Colleges Ontario noted current issues concerning “apprentice training effectiveness” are:

- Few employers have the financial resources or breath of operations to train
- Societal attitudes toward apprenticeship include poor image of trades and career opportunities, poor image of manufacturing and industrial work environment, and poor understanding of income potential
- Modernization of apprenticeship system is required to address:
 - Barriers to entry
 - Inflexible program delivery
 - Low completion rates
 - Lack of “soft” employability skills training
 - Incomplete tracking and rating apprenticeship success

In 2009, Colleges Ontario reported that there were 120,000 apprentices and 300,000 journeypersons active with 35,000 participating employers in Ontario.

Industry and trade unions, education and training providers, national and provincial governments are coordinated and linked through an apprenticeship program. Although industry is a partner to this process it is not clear if industry is the main driver. It is also uncertain if the long training duration and low apprentice completion rate will satisfy future industry employment needs.

*Colleges Ontario, "Transforming Ontario's Apprenticeship Training System", July 2009

MTCU's multiple roles in operating the Ontario Trades apprenticeship program may represent a conflict in interest. When the training and outcomes responsibility is given an independent trainer, apprentice completion rates and durations vastly improves. Witness the 90% plus success rate that the "Joint Training and Apprentice Committee" enjoys today when qualifying the mechanical trades for a C of Q. Vince Kacaba, Director of Training JTAC

We suggest that MTCU continue to give more of the training responsibility to qualified third party industry trainers that are owned and operated by industry and their workforce partners.

Technicians and Technologists

Per the Ontario Association of Certified Engineering Technicians and Technologists, OACETT, "Professions in the fields of engineering and applied science technology are not regulated in Ontario (or in any other part of Canada). Therefore, engineering and applied science technicians and technologists can work without being registered." OACETT, in their 2011 annual report, stated that there are 16,000 practicing licensed CETT's in Ontario or 1/3rd of the total number of technicians/technologists employed in the province.

For Ontario, OACETT is the regulating body for certified engineering technicians and technologists.

"To work under one of the following protected titles, a person must be fully certified and registered with OACETT" as:

- a Certified Technician (C.Tech.)
- a Certified Engineering Technologist (C.E.T.),
- or an Applied Science Technologist (A.Sc.T.)

There is currently a disconnect with 3-year technology diploma credentials. Because many 3 year technology programs are not degrees, technologists working in industry, are automatically barred from management positions – even though someone working in, say, HR, with a 3-year degree in liberal arts, without the technical knowledge, is deemed eligible. And it is also pretty hopeless for a technologist to get accepted into an MBA program. As part of the integrated progression between grades, diploma technologists need to be changed to an earned degree.

The Ministry of Training for Colleges and Universities, MTCU, manage course guidelines and standards for engineering technician/technologist programs created by and for Ontario public and private colleges. MTCU is not equipped to understand nor address the curricula needs of industry in addressing essential skills.

We suggest this responsibility needs to be transferred to Industry with the industry supplied Occupation Competency Profiles provided for job meaningful curricula development by the colleges, universities and private training institutes.

This is reinforced by the following comment:

Engineering and Applied Science Technicians and Technologists (David Thomson, President, OACETT)

“Technicians and technologists are sandwiched between the trades and licensed professions such as engineering and architecture. They constitute a significant work force in sixteen disciplines earning on average \$80,000 per year with strong employment. Technology colleges, both private and public, are facing significant enrolment growth. The Ontario Association of Certified Engineering Technicians and Technologists (OACETT), a voluntary association operating under provincial legislation, have a 57 year history of regulating the profession with right to titles and legislation permitting the establishment of standards for the profession (i.e. Certified Engineering Technologists (C.E.T.), Applied Science Technologists (A.Sc.T.) and Certified Technician (C.Tech.). OACETT has about 25,000 members with 70% certified representing about 20% of the profession. Many technicians and technologists are acquiring business and/or science degrees for career advance, although C.E.T.s and other designations are frequently appointed to senior management positions across all disciplines. A great many technicians and technologists own and operate both traditional service and manufacturing companies as well as high tech companies competing locally, nationally and internationally.”

“OACETT certifies on the basis of competencies (academic and work experience) and with the applicant successfully completing a law and ethics examination. Members are increasingly seeking volunteer certification in part since the market recognizes certification generally with salary premium and government regulations authorize certified members as “qualified persons” to do certain work.”

“OACETT is working with other provinces to develop in 2015 a new national accreditation program to accredit college programs for the purposes of assisting graduates in getting certified, to provide quality assurance of programs, to appeal to foreign students wanting to study in Canada, and to improve national and international labour mobility. One aspect of the accreditation program is the use of independent and trained auditors to evaluate programs, including the need for colleges to maintain industry advisory committees to maintain graduate relevancy in the local labour market. Colleges, but not all, often want national accreditation in addition to the curriculum requirements established by the Ministry of Training, Colleges and Universities (MTCU). MTCU prepares outcome based standards through a consultative process upon which curriculum is established, and frequently measures job placement of graduates as a measure of college performance

Both employers of, and technicians and technologists are increasingly adapting to changing labour needs. For example, technicians and technologists are increasingly developing trade credentials (e.g. to pull wires), or seeking to ladder up to obtain professional licenses. Pathways are not always easily available or navigable as a result of one institution failing to recognize another’s curriculum, protection of turf as one profession seeks exclusive practice rights, or the cost and timelines involved. There is considerable effort being expended at the academic and government level to address these pathway issues. Progress is slow.”

“The recent development of the Bachelor of Technology degree, fostered by articulation agreements between colleges and universities is one hybrid that has potential as college engineering graduates, typically from two or three year diploma programs can transfer readily to a university program. Increasingly colleges are offering degrees with considerable discussion about the potential of polytechnics. Not surprisingly, upwards of 30% of college enrolment are bachelor degree applicants seeking applied college training to secure employment.”

“There is a significant debate underway concerning changing the nature of our colleges, including the offering of degrees, providing more apprenticeship training opportunities, etc. While this is healthy discussion, one has to question the potential of “credential creep”. If technician and technologists graduates from two and three year college programs are earning significant salaries and rewarding careers, and meeting a need of employers, improvements are welcomed but not necessarily wholesale change. A productive engagement is the need to improve in pathways and reducing the barriers to practice as just two examples.”

Engineers

An Ontario Professional Engineering License, P Eng, is obtained from the Professional Engineers Ontario, PEO. As legislated by Ontario, PEO is the regulating body for the profession. Completing an academic program of technical education and/or training, workplace experience with a Professional Engineer, P Eng., along with passing a Law and Ethics exam qualify an individual for a license.

However, there is a major flaw in the PEO licensing practice. Not all Ontario licensed engineers have proven that they have received appropriate training, apprenticeship and competency qualification in their chosen discipline to be considered fully qualified in their profession.

Witness the current disconnect that exists between the professional societies/associations, regulated industries and industry associations. This disconnect can only be addressed by all parties through participation in the education and training process of an “*Integrated Industrial Learning System*”.

Engineers and the ILS (Roger Jones, PEO Councillor at Large)

“Under Ontario legislation, Professional Engineers Ontario (PEO) is the licensing and regulating body for the profession. An Ontario Professional Engineering License, the P. Eng, is obtained from PEO. Completing a recognized technical academic program, training and workplace experience under a Professional Engineer, along with passing a Law and Ethics exam generally qualifies an individual for a P.Eng. license.”

The “mid career” cohort

“However, there is a barrier in present PEO licensing protocol for some practitioners. Many otherwise competent practitioners in Ontario industry are unable to show that they have received recognized scholarship, training and competency qualifications to be considered fully qualified by PEO for the License. The option of returning to university or other recognized educational establishment, or attending for the first time, is not desired or feasible for many. They will simply remain “under the radar”. This is commonly referred to as the “mid-career cohort” problem.”

Industry needs

“In addition, there's a supply-side issue. PEO-licensed engineers, both new and later in their careers, need to be recognized by industry as fully qualified *to industry standards and meeting industry requirements*. Currently, there is a disconnect; new engineering graduates are deemed to lack practical experience. Witness the many employment advertisements demanding “5 years or more experience”. There is also a disconnect between PEO as the regulator and

regulated industries, such as aerospace, marine and nuclear, and industry associations. Basically, PEO has no standing and federal and provincial regulations prevail (not addressed here.)”

“PEO needs to partner with various regulated and unregulated industries that employ engineering professionals, also with affected professional societies, to ensure wider industrial skills are recognized as part of the License. Incidentally, PEO is now looking at a **Structured Internship** program that is expected to become part of the IILS as a component of the “top rail” track (see elsewhere.)”

The Industrial Exception

“Engineering practitioners working in the manufacturing industries were for years exempt from the requirements of the Professional Engineers Ontario license (the P.Eng. designation) under section 12(3)a of the Engineering Act. This was the so-called "Industrial Exception". However, this exception was quite narrow. It only applied to engineering work on *owner's capital equipment in the factory. This did not extend to Pre-Start-up Reviews (PSRs), neither to product development engineering, nor to services to a client at its site, all of which under the Engineering Act required and still require an Engineering License or supervision by a licensed engineer.* The "Industrial Exception" has now been repealed by the Ontario Legislature but, to date (December 2013), has not been signed into law by the Attorney General of Ontario.”

“At this time, industry organizations and various engineering societies, including SME and OACETT, are in discussions with PEO, but have little say as to how industrial and manufacturing engineering skills and competencies are evaluated for the P.Eng. License. Options for a so-called "Limited License" have been in place for a long time, but would require changes to embrace a majority of Manufacturing Engineers in industry.”

A way forward

“With regard to engineering, the IILS is expected to address the above issues, i.e. qualifying new entrants to Manufacturing Engineering, defining a route to the License for the “mid career” cohort and alleviating industry's concern over the repeal of the Industrial Exception (former 12(3)a.)”

Summary Observation

1. The current approach to gaining and qualifying experience for licensure is not enough to ensure that Engineers in Training, EIT's will be gainfully employed and practicing proficiently. The PEO proposed “Structured Internship” will help, however ultimately an apprentice trained and **employed** EIT, should become the major pathway for training and experience using the IILS approach.
2. The current university academic developed programs for engineers date back to the beginning of the last century and do not fully address the business and technical skills, competencies and abilities required for current industry and professional occupations.

The IILS has identified (3) learning areas that industry engineers should be qualified in: Business, Technical (Industry Position Specific), and Relational **skills, competencies and abilities**. Industry is beginning to realize if they are to get the highly qualified and trained technical professionals for their workforce, industry needs to create skill, competency and relational occupation profiles and then either train or seek those institutions that can provide training for these specific occupations.

3. And, finally PEO has not created a means or method to continuously re-qualify engineer's ability to continue their practice. The IILS will enable a lifelong learning process to keep current a professional engineers credential or transition into a new engineering career.

An Integrated Industrial Learning System that, imbeds the proposed structured internship requirements required by PEO, will enhance the proficiency of industry trained industrial engineers. The "industry exception" should not affect installing the IILS into practice.

Current Career Pathways through Transfer and Articulation

A 2009 survey of 15,585 practicing technicians, technologists and engineers by Engineers Canada, EC, and Canadian Certified Technicians and Technologists, CCTT**, found:

- (26%) respondents with college qualification in technology also have a trade qualification.
- A percentage of technicians and technologists also have university qualifications in engineering (6%) and science (6%).
- (57%) of bachelor engineers have other technical qualifications including:
 - Canadian bachelor engineers also have a trade qualification (5%) and college qualification (32%)
 - Non-Canadian bachelor engineers have a trade qualification (23%) and college qualification (24%)

**Engineering and Technology Labour Market Study, Engineers Canada and CCTT, 2009

Despite the difficulty Ontarian practicing skilled trades, technicians and technologists have in creating individual career ladders/pathways, many people continue to develop more than one technology qualification as they advance their careers. These multi-certified and experienced engineers are more highly sought after by industry today.

However, the ladders to transfer from a trade qualification to a college/university technology program of study are virtually non-existent in Ontario making it expensive and more time consuming to advance a career.

Also, per the College and University Consortium Council (CUCC), the current course credit transfer rate from college to university is between 25 to 60%. This may add from 1 to 1 ½ more years of study (and expense) for the student seeking a university degree. The OnTransfer System was started, in 2010, by the CUCC to improve course transfer and articulation success when students plan their personal study pathway for transferring diploma/degree credits from our 24 Ontario colleges to our 20 Ontario universities.

Again, the current training institute/college/university system does not have a well defined career ladder or pathway for the vocational trade or college trained students to transfer and articulate academic credits/credentials into a university technology program.

Summary Observations and Recommendations

Our industry training and education programs are fragmented, underfunded and inadequately structured, satisfying mainly, short term tactical goals. Canadian programs are more dependent on government and education for their delivery than is found in central European countries. Countries such as Germany and Austria have strong government sponsored and industry owned fully integrated career pathway apprenticeship programs. These well defined programs provide their industry with the qualified workforce required to satisfy long term, strategic economic goals of sustained manufacturing GDP and trade surplus.

In Canada, the many trades and technology professions have differing professional goals, skills and competency qualification, and certification and licensing practice. Career ladders (pathways) with a well defined skills and competency progression benefiting from seamless transfer and articulation between programs, between institutions, do not currently exist. This is due to the lack of provincial or national industry or training policies in place for integrated workforce learning systems.

Upon review we firmly believe that the current Ontario education and training system offered to industry is drastically-inadequate as a balanced learning environment for many reasons:

1. The education environments are mostly over-targeted with specific education which does not provide sufficient career flexibility within the industrial sectors.

2. All current education programs provide inadequate and ineffective real experiential hands on industrial training and is not provided in a systematic way.
3. The current education and training programs have a significant lack of grade scalability between the systems to develop professional engineers, technicians and technologists, and the skilled trades.
4. The current programs have a significant lack of learning integration. An optimum learning environment must integrate education training and experience into one effective and seamless process.
5. The responsibilities for such a learning system are fragmented and need to be better defined and organized.

These inadequacies are the major reasons for a lack of effectiveness in sustaining a much needed industrial workforce, let alone preparing for any further recovery and growth in these industrial sectors.

It is imperative that we undergo a significant change in the way we provide learning in terms of education, training, and industrial experience to our future technical workforce of managers, engineers, technicians, technologist, and trades persons.

The desired outcome must be fully industry qualified, licensed, and employed technical professionals using a successful and sustainable System.

We believe the only way to accomplish this task is through the development of an “**Integrated Industrial Learning System**” for Ontario (and for Canada).

The Proposed Solution

Just this year, Canada signed a trade agreement with the European Union. This is an important step for Canada to make our natural resources and industry manufactured goods more available for trade to the EU. However, we must also recognize the core manufacturing strengths of key European industrial countries such as Germany, Austria, and Switzerland; enabled by strong government industry and trade policies, and by strong industry supported systems of apprenticeship. Not only do European models of apprenticeship help large business

to thrive and prosper, it also equally enables a competitive Small Midsize Enterprise (SME) network of business to develop new products and services created by an apprentice trained workforce. These industry strengths create a European manufacturing competitive advantage over Canada. And, in the future, the prediction of a strong Canadian petro dollar and weaker Euro will shift the trade advantage more towards the Europeans, further weakening Canada's trade balance and Canadian prosperity.

Along with a new industry policy of Balanced Trade and Balanced Sourcing, the proposed **"Integrated Industrial Learning System"** is our greatest opportunity to create a core group of Canadian technical professionals and technical managers that will reverse the negative trend in Canadian manufacturing GDP. Through this new apprenticeship training system, Canadians will be provided a complete learning system of education, training and industrial experience to make Canada competitive again. The system will ensure that both large and SME industries and businesses will have the best opportunity to develop, grow and thrive.

However, three societal conditions must exist for this **"Integrated Industrial Learning System"** to become a working reality;

First, apprenticeship and "Apprentice Trained" be formally recognized as "professional education", strategically addressing the needs of industry; flexible, adaptive and growing to new industry requirements.

Second, the apprenticeship and "Apprentice Trained" are "masters in their profession" and becomes the acknowledged brand of high social status; officially by government, the engineering profession, industry and the public at large, enabling individuals to succeed in lifelong learning and continued professional mastery.

Finally, the "System" and the trained people it delivers; fully qualified, experienced, employed and licensed to practice, is economically viable and sustainable, and is tied to the national economic good; through strong government policy, industry ownership, and education support.

Our solution outlined above is the **"Integrated Industrial Learning System"**

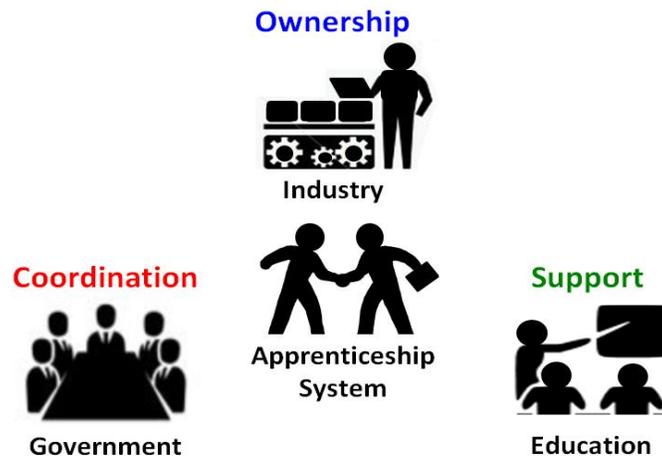
This workforce learning and development system must be coordinated by government for the benefit of the local economy, owned by each industry sector, supported by the educational system and fully embraced by the general public so that it develops a globally competitive technical workforce that is industry qualified, licensed, and highly employable using integrated and scalable learning to administer education, training and experience.

*It must be **owned** by Industry to ensure they take full responsibility for the next generation of the workforce they will need in the future within each manufacturing sector for those businesses to be successful.*

*It must be **coordinated** by government to ensure it is aligned with local economic needs.*

*It must be **supported** by the education and training establishments to ensure they provide effective education and training services to the users.*

Joint Industrial Apprenticeship System



It must become a career development system that is fully **embraced and understood** by the general public so that it motivates and encourages growth in skills and knowledge to allow the general public to visualize, participate and benefit from sustained job creation.

The Ontario population understands how dependent the province is on manufacturing now and into the future, and the need to provide for a highly skilled and competent workforce that can compete and succeed globally. So, if this apprenticeship system is going to work, it also needs to be firmly and positively embraced by Ontarians.

Why Apprenticeship and a System of Apprenticeship

An Apprenticeship is a mutual investment contract between both the employer and the employed apprentice. Unlike co-ops' or internships which are mainly driven as post graduate or more casual segments of industry based experience with no set mutual goals, an apprenticeship system indentures an apprentice to that specific business within a specific sector. This business enters into an employment contract with the apprentice to have them work for that employer who then supports the apprentices through a complete career pathway to learn their trade or

profession in exchange for their continuing employment effort for an agreed period within and after they have achieved measurable competencies.

Further, this Apprenticeship System, as we define it, must provide complete and integrated career learning for a new generation of practitioners against a structured competency. Apprenticeship programs will involve theoretical education or training that is provided either internally to the business or through a pre-designed education or training establishment. The employer also will follow a pre-designed plan to expose the apprentice to all the business learning conditions needed to meet the competency. The period of time to complete this Apprenticeship process will vary depending on the design of the program.

To be successful, the individual must have perseverance, ambition, and initiative. The successful completion of an apprenticeship term will not be without effort and focus, and, as a result of hard work and personal achievement on the part of the apprentice, become a **hallmark social value**.

Apprenticeships must be provided across a range of grades from trade occupations to those requiring a professional license to practice in a regulated profession.

We also believe that to maximise the use of all our human resources we need the “**Integrated Industrial Learning System**” to be scalable across all trade, technical and professional disciplines, so that we develop solid career pathways. Also, it must be designed as a continuous, unimpeded progression through the grades, so that with the correct application of effort, any career goal is achievable. Education and training material must be industry recognized and transferable so it facilitates waste free progression from one grade of apprenticeship to another as well as some reasonable conversion between technical disciplines within and across industry sectors.

Competency Based Learning:

The Apprenticeship program must define the workforce competencies so we can build a globally competitive workforce. Industry knows or should know which occupation classifications and qualifications are necessary to be competitive. **Industry must lead this requirement**, not our government or our education community.

The United States has developed a national program to develop career competency models with ladders to other careers. It develops its model around skills, competencies and tasks completed. (See Appendix IV)

The Ontario Aerospace Council has identified a more comprehensive method to identify knowledge, skills, abilities and outcomes based competencies (less task-oriented) that more clearly define each career profile. (See Appendix V)

OAC believes the following three competencies are what our employers should look for in an employee and are identified in the following three major areas:

- Technical Competency (Position Specific)
- Business Competency
- Relational Competency

These competencies need to be imbedded in each grade of apprenticeship program if the training is going to be successful. Of course, high school and academy boards of education need to develop student preparatory skills in technical, business and relational competencies in their academic stream. Industrialists, with support from Educators, will work to specify these essential skills for apprentices entering the system.

Per Rod Jones, OAC Executive Director

“The Ontario Aerospace Council is keen to provide leadership in introducing some completely different concepts and methods for directing and managing employee training and development that will enable dramatic improvements in the effectiveness of knowledge and skills development across the spectrum of advanced manufacturing sectors in Ontario, including aerospace, auto parts, nuclear, and others, while offering substantial reductions in associated training and adjustment expenditures by the Government Ontario.”

“We need to have:

1. A system for recognizing learning achievements by employees that:
 - a. is defined by industry, based on required competencies (knowledge, skills and abilities)
 - b. supports their company advancement and career development through connected pathways for learning progress (ladders and bridges)
2. Learning processes for employees that are:
 - a. based on competencies (knowledge, skills and abilities)
 - b. driven by outcomes (achieved competencies)
 - c. reliable across all learning organizations
 - d. delivered through active collaboration between industry firms and our educational institutions and other learning organizations
 - e. delivered in modular, accessible ways, taking full advantage of modern learning technologies”

“Such a recognition system and learning processes will contribute hugely to ensuring that Ontario’s Youth Jobs Strategy will result in job-ready young people who can quickly reach the required job performance levels employers want, and be productive, high-performing and highly satisfied employees who can successfully pursue rewarding careers in advanced manufacturing in Ontario.”

Labour Market Information (Parallel Development to IILS)

Rod Jones also continues:

“Access to accurate, timely and comprehensive labour market information is important to ensure workers have the best chance to be matched with available and appropriate job opportunities. However, forecasts are not flawless, so we also need much better ways to enhance the mobility of workers, to enable them to seize available job opportunities when they arise. At the same time, we must ensure more effective labour market participation by all segments of Society (Aboriginal people, immigrants, disadvantaged people, minorities, etc.).”

The Labour Market Information System created needs to be employer/employee interactive and project **real time** industry job opportunities and opportunities for paid apprenticeship and training as well as meaningful and accurate data for industry, government, and education institutions to use to plan and provide resources for training and education.

Other reasons for a system of apprenticeship/traineeship are as follows:

- We must **design the system** so that it provides an integrated career pathway that delivers a fully qualified practitioner at each certification step with the ability to grade up (or down) within the system to ensure that all participants as much as practical have the opportunity to be the best that they can be with meaningful results in terms of career value.
- It must provide apprenticeship courses that are fully transferrable and articulated to and between post-secondary colleges and universities and are transparent and at least cost to all apprentice and training participants.
- The Industrial Training **System** must integrate and incorporate the standards and requirements of all existing industry and industry associations, labor organizations, professional associations and societies, and harmonize the activities of both public and private education and training institutions and organizations. (See Appendix VI)
- We believe the Industrial Training **System** must be an economically measureable and mission sustainable enterprise and must utilize proven learning methodologies as well as

utilizing lean management principles so that , we can reduce program delivery risk, output quality and completion rates

- The **system** needs to engage students and start the recruitment early at the high school level so that it enlists an apprenticeship pool of the best, the brightest and the most talented, from all sectors of Ontario society.
- We also must take significant actions to attract young people to manufacturing careers, and this is one of the most important aspects of this system and we need to make it become recognized as the learning/occupation destination of choice, for all high school students interested in a career in industry.
- Also, the public image of manufacturing needs work, it's still perceived as dark dirty and dangerous ... The next generation must see manufacturing as sexy and something to build their future upon.
- The **system** must also support all mature workforce members wishing to advance further, so providing a life-long progression of learning.
- The **system** needs to create training progressions to support harmonized occupation standards developed by our industry sector councils

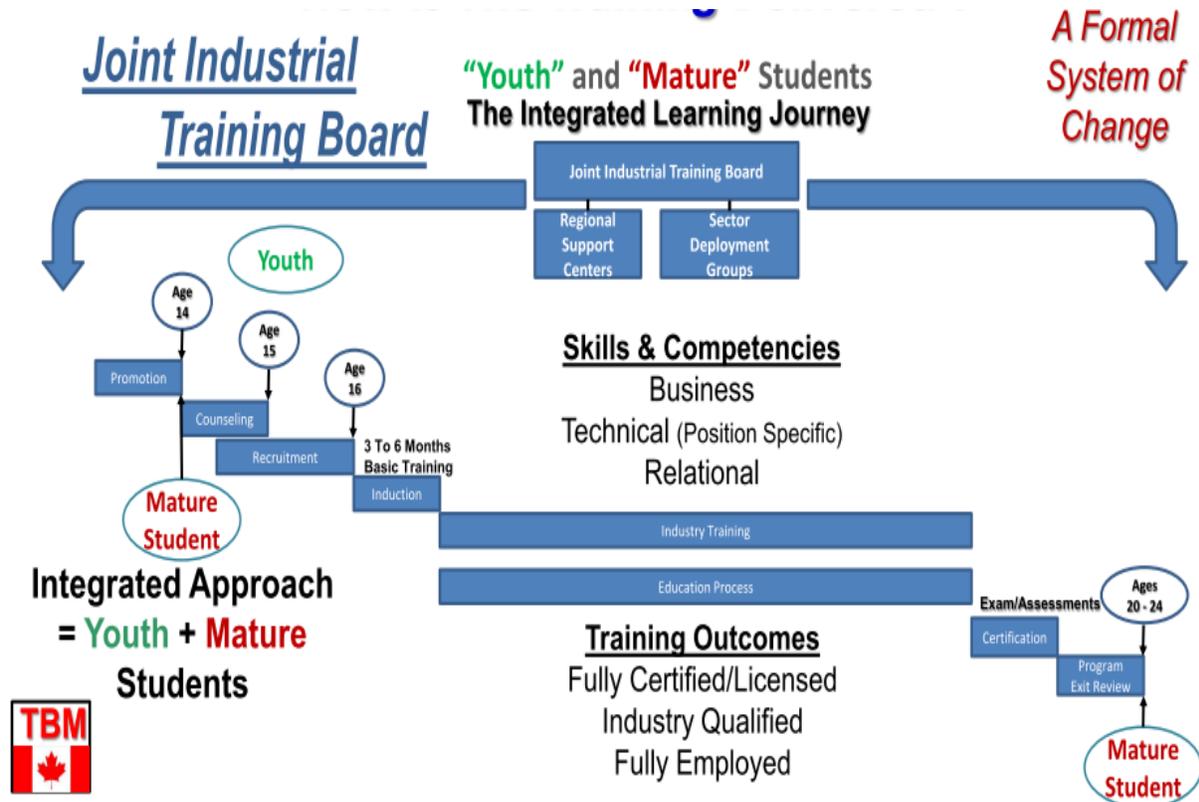
These include:

- Occupation Classification: title, grade, description
 - Skills and Experience Standards: academic, workplace, industry technical, personal effectiveness with established core curricula across similar disciplines and grades
 - Certifications; includes academic certificates, diplomas and degrees specific to the Industry.
- We need to encourage, enlist and mobilize all our industry trainers and our technical educators operating both formally and informally, and fully involve the knowledgeable and experienced industrial professionals to lead, manage, provide and support the system. Also we need to engage the best sources of up-to-date facilities and equipment via these industrial relationships.

To summarize... *our challenge* is to create an economically viable and mission sustainable *"Integrated Industrial Learning System"*

The Integrated Industrial Learning System.....

The Plan:



The focus of this plan is to create an Ontario apprenticeship system that undertakes an integrated and graded apprenticeship approach for all industry trades, technical grades and professions

Please note: *The terms Apprentice, Apprenticeship, and Apprentice Trained are terms used in the Integrated Learning Journey described in the following dialogue. Trainee, Trainee Trained and Traineeship may be substituted for the above terms used provided it is taken in the context of an employee/employer contract for training and employment. (We did not use the term intern because in Canada the term is used sometimes in the context of unpaid employment. Take Back Manufacturing believes that any individual working in the IILS will be employed and paid under fair and equitable terms, standards, and pay scales that meet or exceed all industry, provincial and federal requirements.....)*

Joint Industrial Training Board (*One System of Governance*)

All current education and training providers, professions and professional regulators, industry and industry associations and government agencies and ministries are invited to participate and share in the organization, development and growth of this apprenticeship system.

We believe the governance of this model and the Ontario Integrated Apprenticeship System will be by a newly formed **Joint Industrial Training Board, (JITB)** that convenes full time to design and administer the plan.

The focus is on a sustainable mission and achieving economic goals. The JITB operates as the primary system administrator and decision maker. All Partners; Participants, Supporters and Contributors will come from one of three groups: Industry, Government, and Education

1. Charter Responsibilities

The principal object of the Joint Industrial Training Board is to administer the delivery of apprenticeship trained and educated tradespersons (Certificate of Apprenticeship) and technicians, technologists, and engineers (Certificate of Apprentice Trained) to established and maintained competency standards and skills required by industry, supported by education and regulated by government, and that serve and protect the public interest as enacted by the Government of Ontario and governed by JITB By-Laws.

2. Board Membership

The JITB is comprised of members with one member appointed from the Government of Ontario that acts as chairperson. The remainder of the board is comprised of 12 members;

- (3) **Government**
- (6) **Industry**
- (3) **Education**

Potential Partners; Participants, Supporters and Contributors are as follows:

- **Three Levels of Government** (Facilitator)
 - Federal: HRSDC, CDA, Red Seal, etc
 - Ontario: WPO, OYAP, MTCU, OCT, OMC, etc
 - Regional: Workforce Planning Boards, Local Governments
- **Industry** (Owner)
 - Sector Councils: OAC, OMC, CPSC, RAC, etc
 - Business:
 - Ontario's Workforce Shortage Coalition
 - Ontario Chamber of Commerce
 - College/University Industry Advisory Councils
 - Associations: CME, APMA, etc
 - Professions: OACETT, PEO, CAF, SME, etc
 - Labour: UNIFOR, CISIW, etc
- **Education** (Supporter)
 - Colleges Ontario, Ontario Career Colleges, etc.
 - Private Training Institutes
 - Public and Private Universities

3. Deliverables

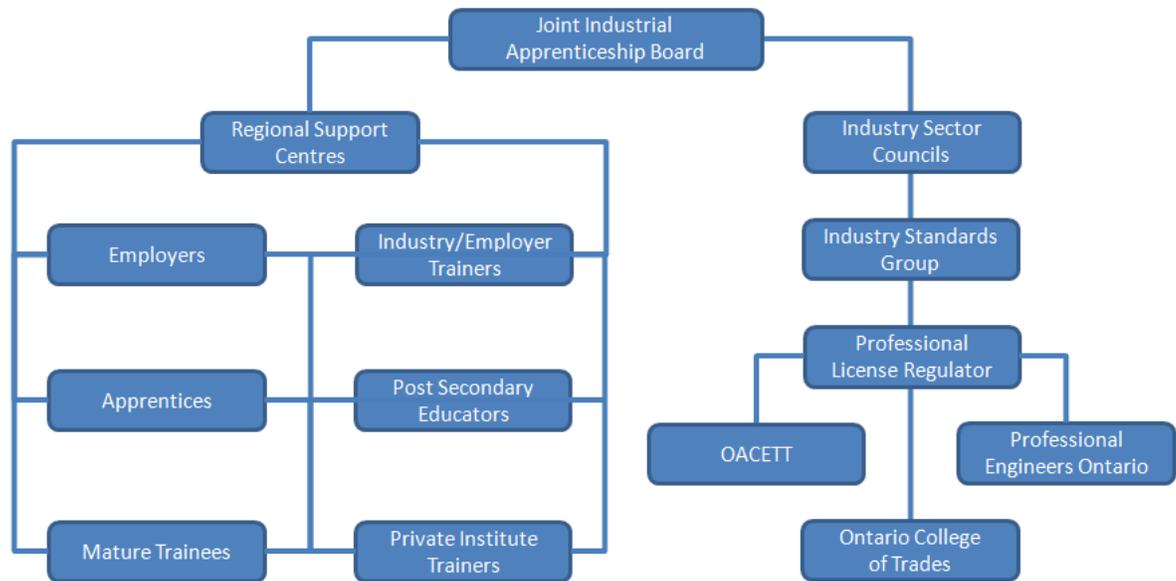
The JITB has three main deliverables:

- a. **Apprentice Training**
- b. **Industry Career Development/Re-Development**
- c. **Professional Training/Retraining**

The JITB success is measured for each deliverable above, and is linked with firm industry demand projections that direct industry workforce development and training needs. Of course, the type of highly educated, trained and experienced workforce needs to match what industry needs and deserves. A real-time, accurate approach utilizing an IT network that determines these industry demand projections needs to be developed.

JITB success is also measured by how well it provides the skills to our industries, generates prosperity for our citizens (stable manufacturing careers with higher incomes) and our governments (higher tax revenues from individuals and industry contributing to budget surplus).

Integrated Industrial Learning System for Ontario



a. Apprenticeship Training

The JITB will design and undertake an integrated and graded apprenticeship program for all trades, technical grades and professions per industry requirements. The program includes ***ALL Grades of Skill and Experience.***

The JITB Apprenticeship training deliverables are listed as follows:

- Provides integrated and scalable career pathways that delivers fully qualified practitioners at each grade certification step.
- Provides apprenticeship program pathways that are fully transferrable and articulated between all post-secondary colleges and universities, transparent and at “least cost” to all participants.
- Fully utilizes our industry trainers and our technical educators with up-to-date facilities and equipment.
- Creates strong careers, lifelong learning, and full employment for our Canadian youth, new professionals and ongoing workforce
 - Communicates and promotes this process to young people who have already left school and to those that are still in school and their parents.
 - Supports school leavers, current professionals, those employed anywhere in the economy including those new to manufacturing, by allowing entry at various stages of the program.
- Sets up career development programs for young people.
- Builds and rebuilds strong career and employment goals for the next generation.

b. Industry Career Development/Re-Development

The JITB is also there for both industry and individual employees that follow a dual progression of industry workforce skills development and individual career growth. When skills and competency requirements change as markets evolve, the JITB will change its training plan to match the new requirements.

The JITB training deliverables are as follows:

- Provides career development consulting centers
- Sets up career redeployment for those already in the workforce.
- Makes this apprenticeship training system the major manner with which we upgrade and replace our workforce quickly and effectively.
- Provides a system designed so that *Career Pathway* mobility from trades to technical and business professions exists without wasted effort.

c. Professional Training/Re-Training

Professional training and re-training of management and technical staff will be available through the JITB to upgrade skills and technical competency to newly evolved business and technical knowledge. Individual, targeted courses or specialized programs linked to firm industry demand projections, will be offered to support employment and industry development.

4. Apprentice Training Integrated With Education

Apprenticeship training programs may become a model for “work integrated study” that supports a progression of lifelong learning, achieving higher levels of skills, competencies, and credentials that allow individuals to advance their careers. Efficient and seamless transfer and articulation from high school to colleges and training institutes through to universities *is the key enabler* for successful education program integration and progression. Industry experience and industry training earned credits is an important component that needs to be recognized and integrated with education.

JITB Training Deliverables are as follows:

- Agree to pre-requisite requirements for high School diplomas... subjects to qualify, skills assessment prior to apprenticeship start, etc. (To improve completion rates)
- Require industrial sectors to design and document minimum career related training outlines to ensure integration with scholastic training.
- Agree to industry sector training architecture with some commonality so they may better support career pathway mobility. (transfer and articulation)
- Agree to a generic training/education core curriculum for similar or same/similar disciplines.
- Scholastic training must be harmonized across industry sectors.
- Agree to harmonized milestone certificates and diploma award points in this process.
- Agree and operate a formal school leaving and mature applicant injection process ensuring and maintaining apprenticeship system integrity.
- Apprenticeship completion rates and program costs must be transparent and accurately assessed to ensure improving student completion rate career entry success.

5. Administration

a. Responsibilities

- Apprenticeship enrolment and ounseling offices will be setup in each region and be integrated into the industrial and educational opportunities and resources of that region.
- Employers will have an apprenticeship exit option... but only after apprenticeship system responsibilities are 100% fulfilled... unavoidable early termination will be reviewed and apprenticeship will be relocated by government body on a priority basis.
- Drop-outs and non-completions will be monitored and re-enlistment rules will be enforced to ensure system is productive and does not get abused.

b. Funding

- Participant funding to be shared between... industry/government/applicant and applicant's sponsor

c. Communications

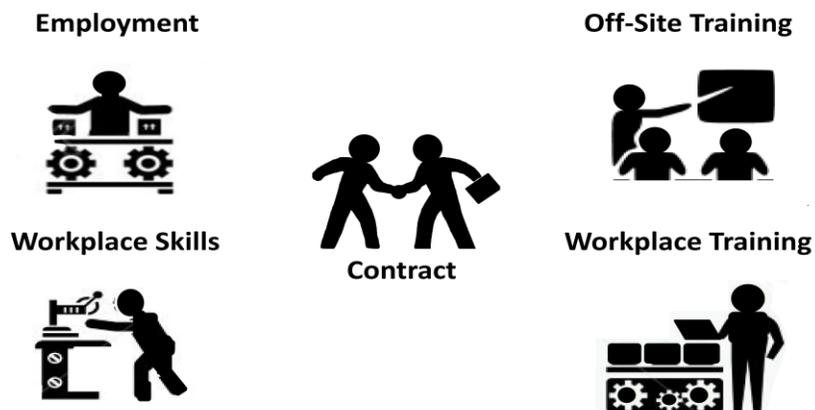
- Provides a database of Central Information/Network System for employers/trainers/program administrators/skilled trades created and operated by industry/trainer partnership.
- All current professional societies and associations will integrate requirements and operate ONE system of acceptance within this apprenticeship process.
- Provide a database Pool of Industrial trained apprenticeships created and managed in each area...

Youth & Mature Apprenticeship Structure

1. Apprenticeship Defined

- a. An Integrated System (youth and mature student) of on-the-job training and work experience while in paid employment, in combination with formal off-the-job academic training.
- b. The apprentice enters into an apprenticeship agreement (contract), with an employer, which imposes mutual obligations beneficial to both parties.

Apprenticeship



2. The following suggested **Industry Recognized Credentials** are to be put in place for the apprentice trained skilled trades, regulated and licensed by OCT. JITB will take over the **Certificate of Apprentice** from MTCU.

The value to industry, of the “**Apprentice Trained**” professional, also needs to be recognized. A certificate of apprentice is awarded when industry and academic training is completed along with the work experience required and accomplished. The certificate will indicate which grade the apprentice “**mastered**”.

New designations for apprentice trained engineering technicians/technologists and engineers are suggested. Again, JITB will issue the **Certificate of Apprentice**.

“**Apprentice Trained**” Engineering Technicians and Technologists will be licensed by OACETT.

Engineers will continue to be licensed by PEO with a new “**Apprentice Trained**” Industry license for engineers practicing in such professions as industrial engineer, manufacturing engineer, plant engineer, engineering manager, etc.

a. Skilled Trades are conferred by

- i. Certificate of Apprenticeship (JITB)
- ii. Certificate of Qualification (Ontario College of Trades) License

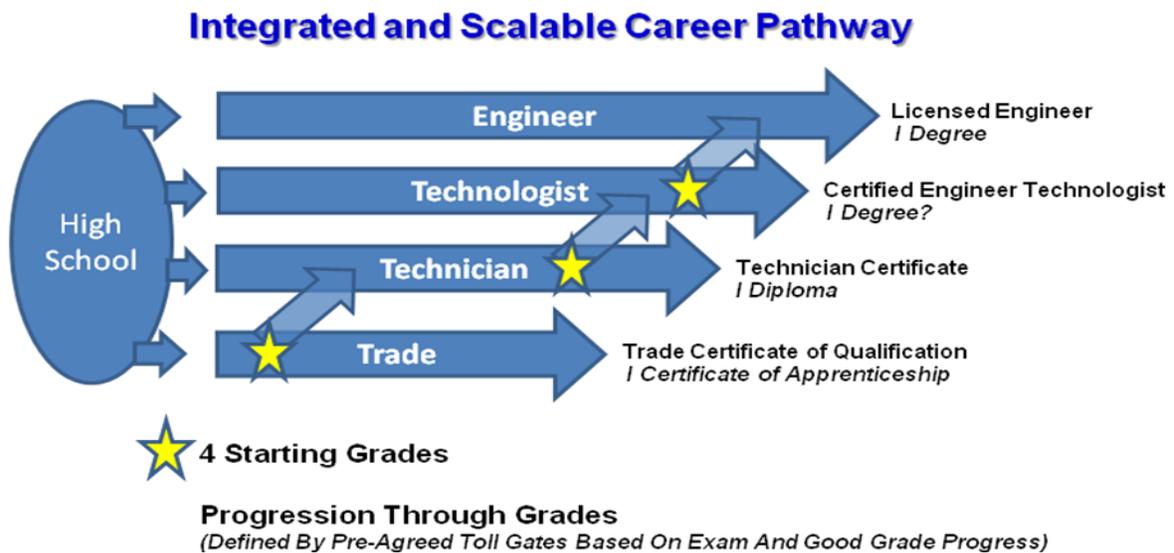
b. Technicians/Technologists apprentice program completion is conferred by JITB with an additional designations by OACETT as suggested below:

- i. Certificate of Apprentice Trained in Engineering Technology (JITB)
- ii. Apprentice Trained Certified Technician (C.Tech.^{AT}) License
- iii. Apprentice Trained Certified Engineering Technologist (C.E.T.^{AT}) License
- iv. Apprentice Trained Applied Science Technologist (A.Sc.T.^{AT}) License

c. Engineers are currently licensed by PEO. The PEO organization might consider an additional designation for Industry Engineers. Apprentice program completion is conferred by JITB.

- i. Certificate of Apprentice Trained Engineer (JITB)
- ii. Apprentice Trained Professional Engineer (P.Eng^{AT}) License

3. **A Grade Progression Model** is an integrated approach for apprentices to master their skills across the four grade level competencies as they master their technology manager and/or technology practitioner certification/license. The model is graded in a seamless progression (a stepped approach) of transfer and articulation from the skilled trades through to engineering technician/technologist, and engineering professions.



- a. Youth Apprentices and Mature Students (From the workforce) are tested and qualified to either enter the trade or technology apprenticeship level to start their on-the-job career training progression. Career counselling and aptitude/proficiency skills testing are some of the tools developed and used for qualification.
- b. Apprentices progress to their level of interest and competency until they attain a certificate of apprentice/apprentice trained and a certificate of qualification which may include a license to practice
- c. Industry sector focused programs apply their standards for common induction and training to qualify apprentices for certification.
- d. The Joint Industrial Training Board oversees the progression and standards for training and apprenticeship, awarding the certificate of apprenticeship or certificate of apprentice trained
- e. Training standards and program topology included:
 - Training and Instructional Design
 - Curricula Development and Delivery
 - Training Technologies
- f. Funding methods include; grants, tax exemptions and incentives, awards programs, etc.

Youth & Mature Apprenticeship Process.....

The journey can begin while attending high school and may end in the early 20's with a full time career start. It may also be started with a mature person requesting to join such an apprenticeship program to extend or further an existing career or to relocate to a new role.

There are multiple points of entry; from the beginning as youth apprentices or high school graduates, from college/university graduates or from the experienced workforce.

Prequalification and acceptance of college/university credits and/or workplace skills and experience are an essential part of the process to enter this apprentice skills progression.

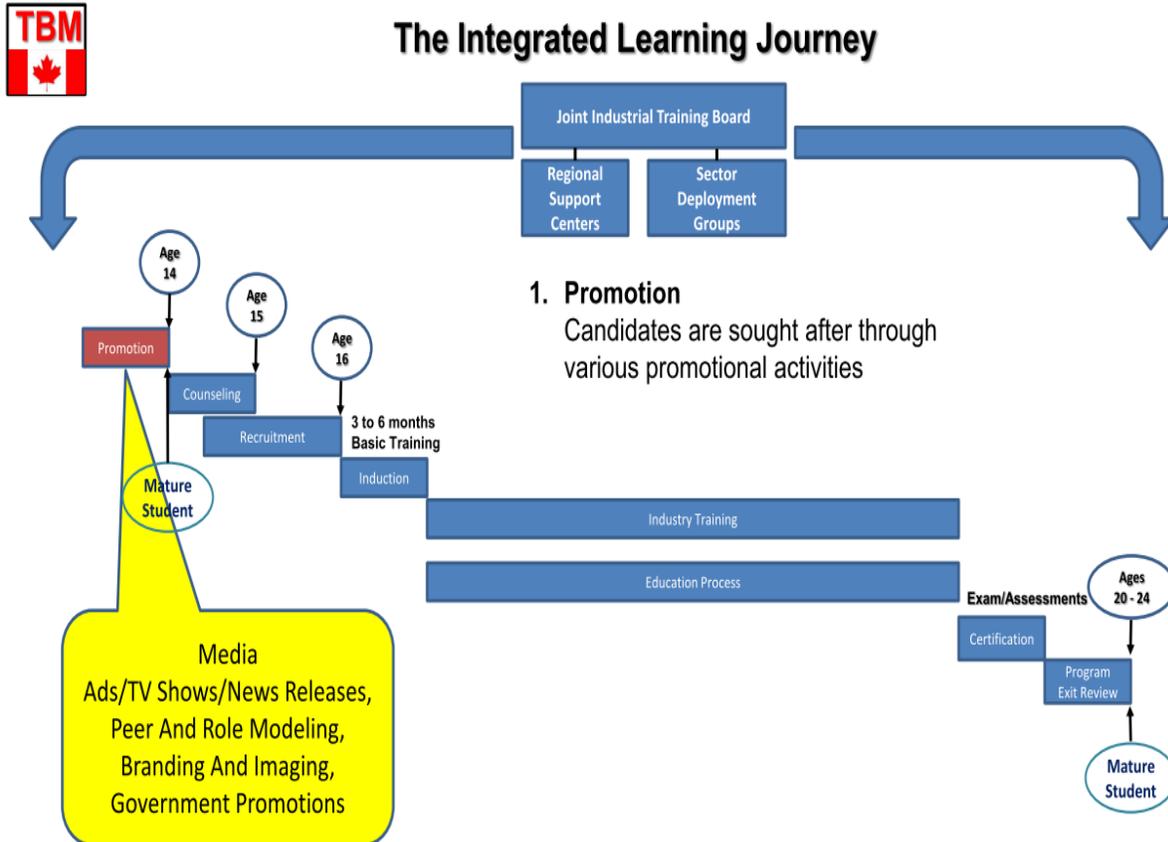
The JITB may also administer other industry defined training or intern programs where the student is a paid employee working toward a career credential in a systematic, training and qualification process with an employer/employee signed agreement in place.

The term apprentice or apprenticeship should not be a limiting term to use the IILS and JITB to manage their industry training process.

The following process will typically be followed for any age or experienced student:

Youth & Mature Apprenticeship Process.....

1. Promotion



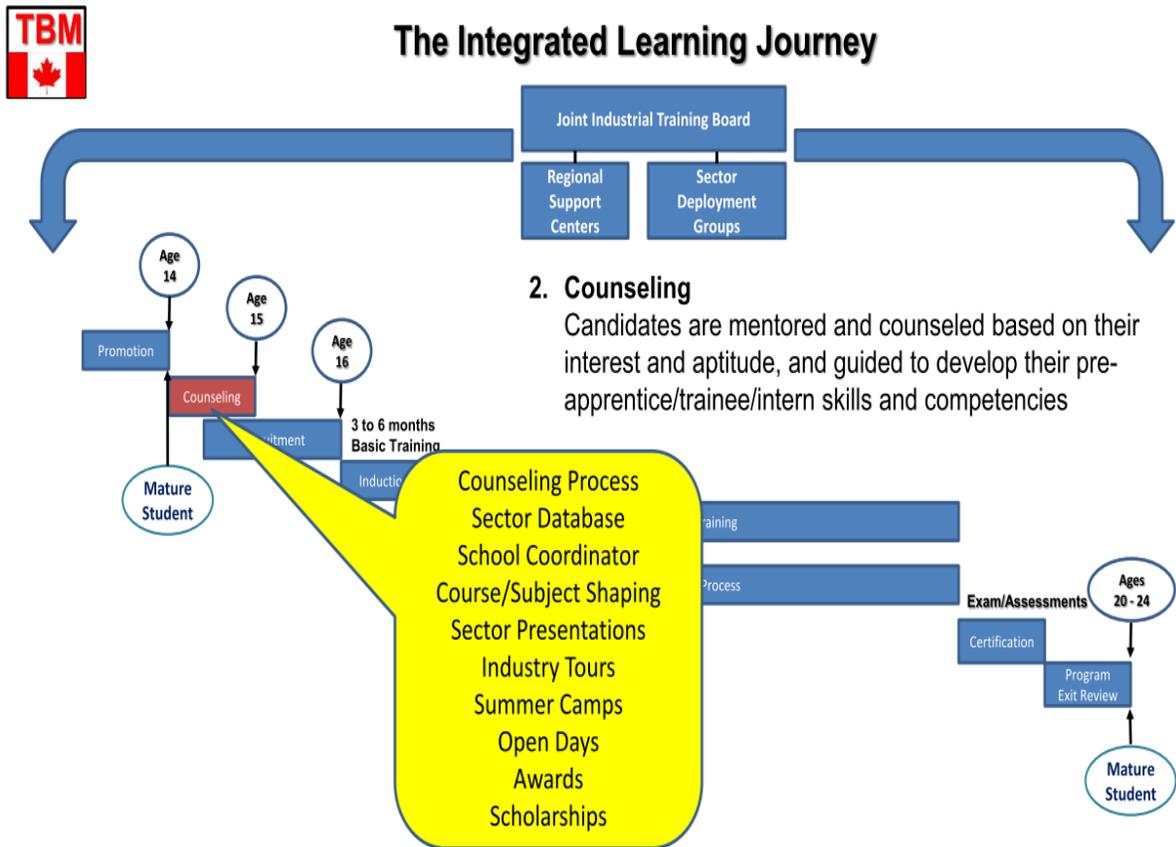
Knowledgeable industrialists are deployed into our school system to re-educate everyone, including the educators who may not have a good grasp of manufacturing as a career. This approach is *a must*, to effect the necessary change in mind-set. We have had three decades of people viewing manufacturing as dirty, dangerous, and risky, unstable employment.

We have a lot of work to do to change this negative image. Just-telling the real story about how exciting a manufacturing career can be, and showing what we as manufacturers do for our economy, will help us prospect the best and brightest candidates.

High School and Academy School Boards are engaged to develop and promote youth apprenticeship.

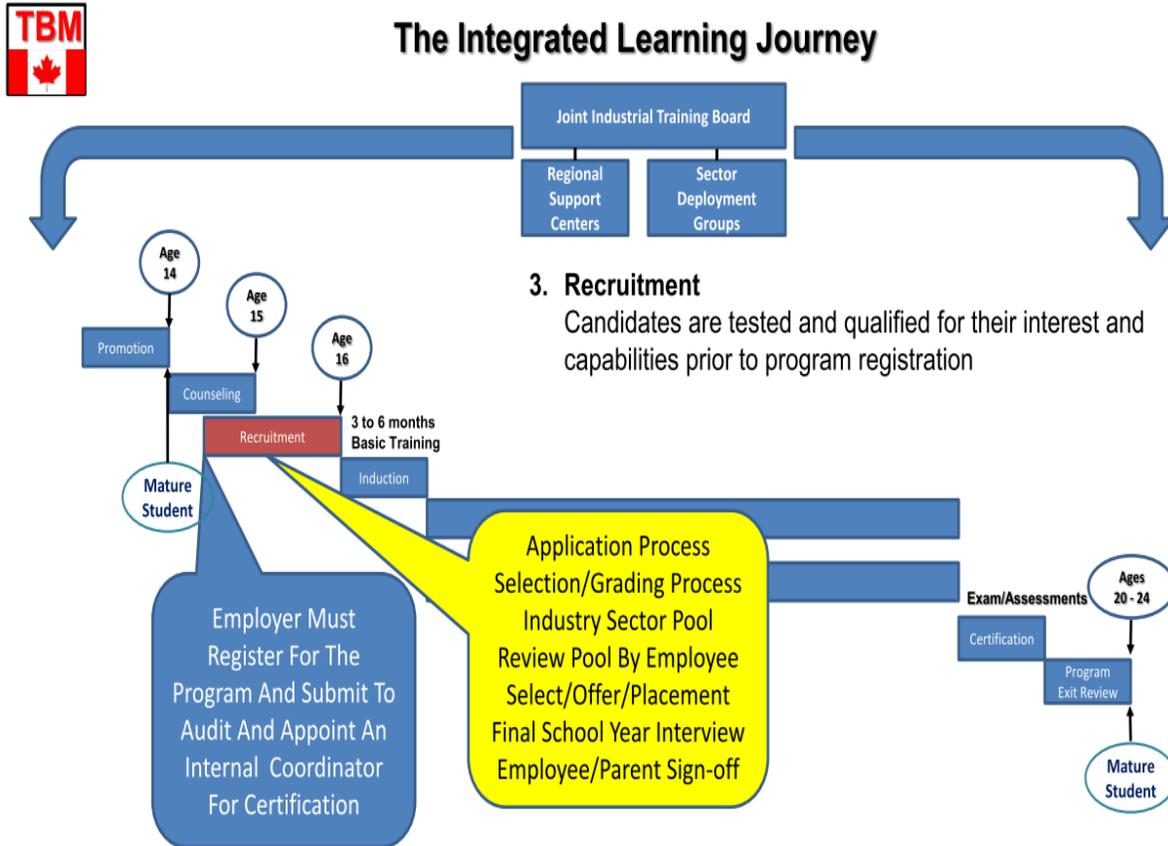
Industry will council and encourage mature candidates to see how it can upgrade its existing workforce to avoid redundancy and resource waste. It should be possible for the apprenticeship process to be applied throughout the work life of an individual so that the message is ***“learning and advancement will be continuously rewarded”***

2. Counseling



High School and Academy School Boards are engaged to provide apprentice counselling

3. Recruitment



Note: Some steps may not apply if student is Mature and employer sponsored.

High School and Academy School Boards for youth apprentices as well as industry for the mature student are engaged to assist in the selection and application process.

- The employer must register and be certified for the apprenticeship program and participate in a predefined recruitment process.
- The candidate must apply and an interview process and selection activity takes place. This may include certain aptitude and skills testing.
- After the selection process the successful candidate, the employer and the local regional support center representative will sign an apprenticeship agreement contract.

An Apprenticeship Agreement will follow these guidelines

The apprentice must earn a certificate of apprenticeship/apprentice trained when the apprentice has acquired the requisite academic, technical, workplace and interpersonal skills (employer and exam qualified) and the requisite workplace training experience completed..

Employer Training

- Employer agrees to provide the apprenticeship on-the-job training
- The apprentice works under the supervision of the requisite qualified trades, technician, technologist, or engineer for the duration of the agreement for the qualified employer.

Apprentice Education

- The apprentice receives a Certificate, Degree, Diploma etc.
- Completed courses of study are ***fully Transferable and Articulated*** for additional academic training and credentials.

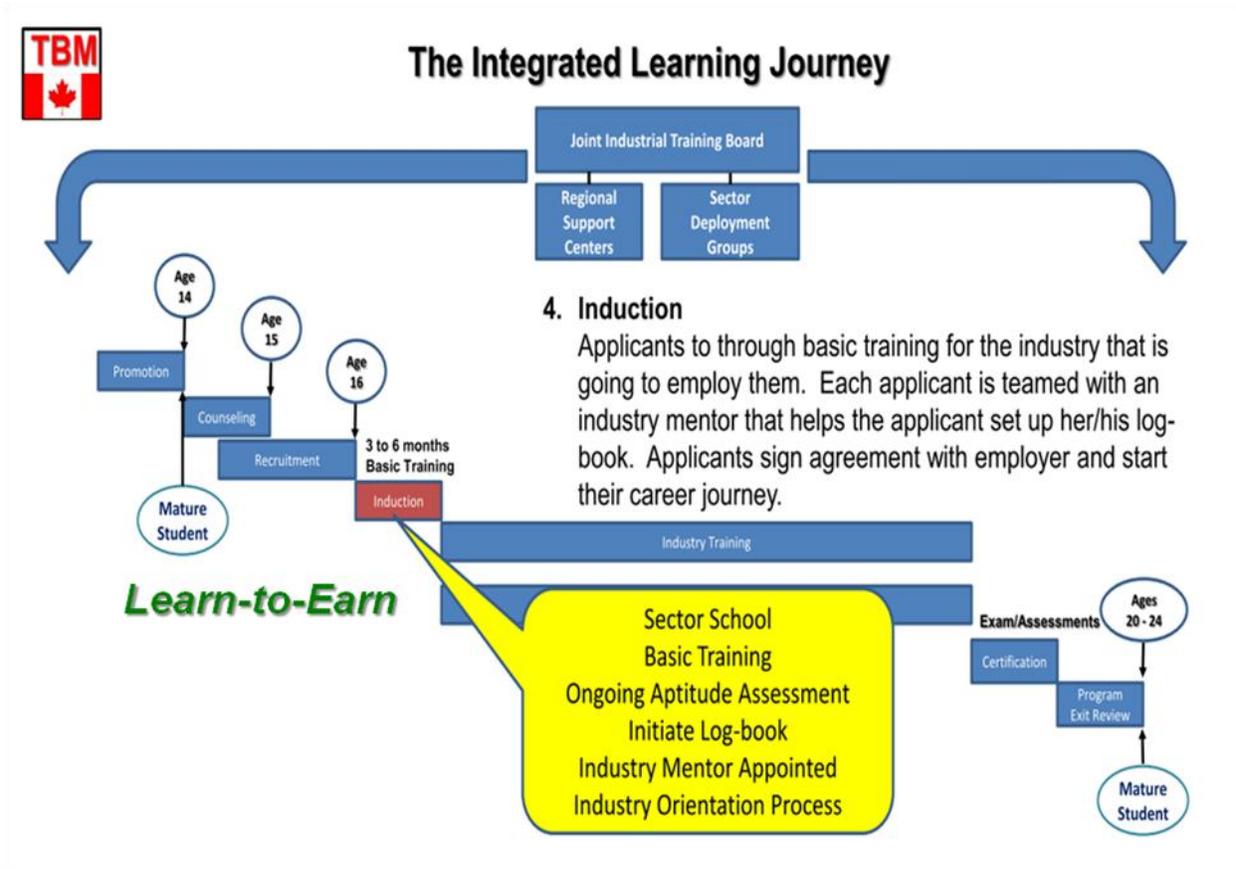
Compensation

Apprentice wages are 100% paid by the employer based on pre-defined rates setup by the JITB (tax credits will apply to the employers business)

Outcomes and Timing

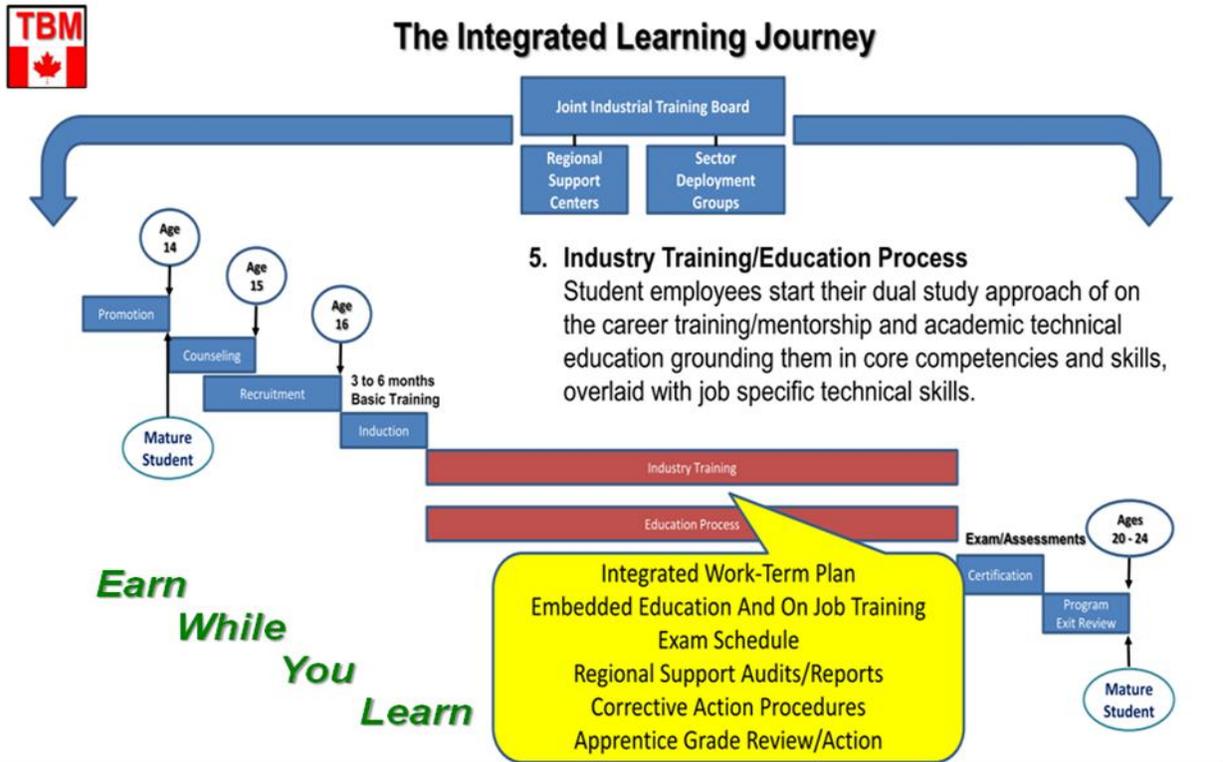
- Length of apprenticeship will be per the pre- defined apprenticeship agreement and will vary depending upon the apprenticeship program being undertaken.
- After completion of the certification process the former apprentice works for an agreed upon term of employment for the employer as defined by the apprenticeship agreement.

4. Induction

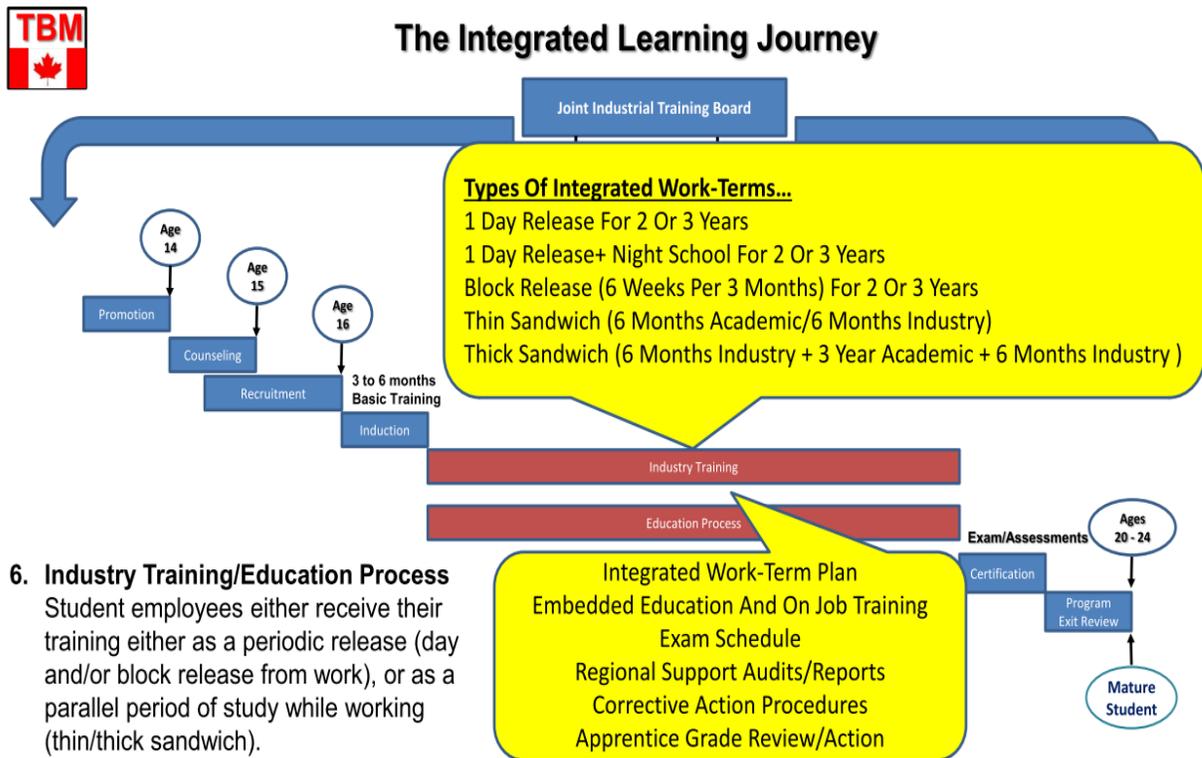


Note: Some steps may not apply if student is Mature and employer sponsored.

5. Industry Training/Education Process



6. Industry Training/Education Process



Integrated Industrial Learning System for Ontario

- Each industry deployment group which represents that industry sector will define the apprenticeship package options offered per sector and per regional area.
- This will consist of a common induction training package and some commonality between sectors will be maintained as well as specific sector content.

Note that the learning is only possible if the apprentice is employed within industry. The system will not function in any other way.

Industry Recognized Skills Competencies will be developed by industry and are designated:

- a. **Business**
- b. **Technical (Position Specific)**
- c. **Relational**

Note: To earn a Certificate of Apprenticeship; Skilled Trades or a Certificate of Apprentice Trained; Engineering Technology or Engineering, all three skills competencies need to be acquired, as required by the Industry Occupation Standards developed by the Sector Councils.

- They are earned by completing a course of training delivered by a qualified employer,
- And a course of study delivered by a qualified education institution

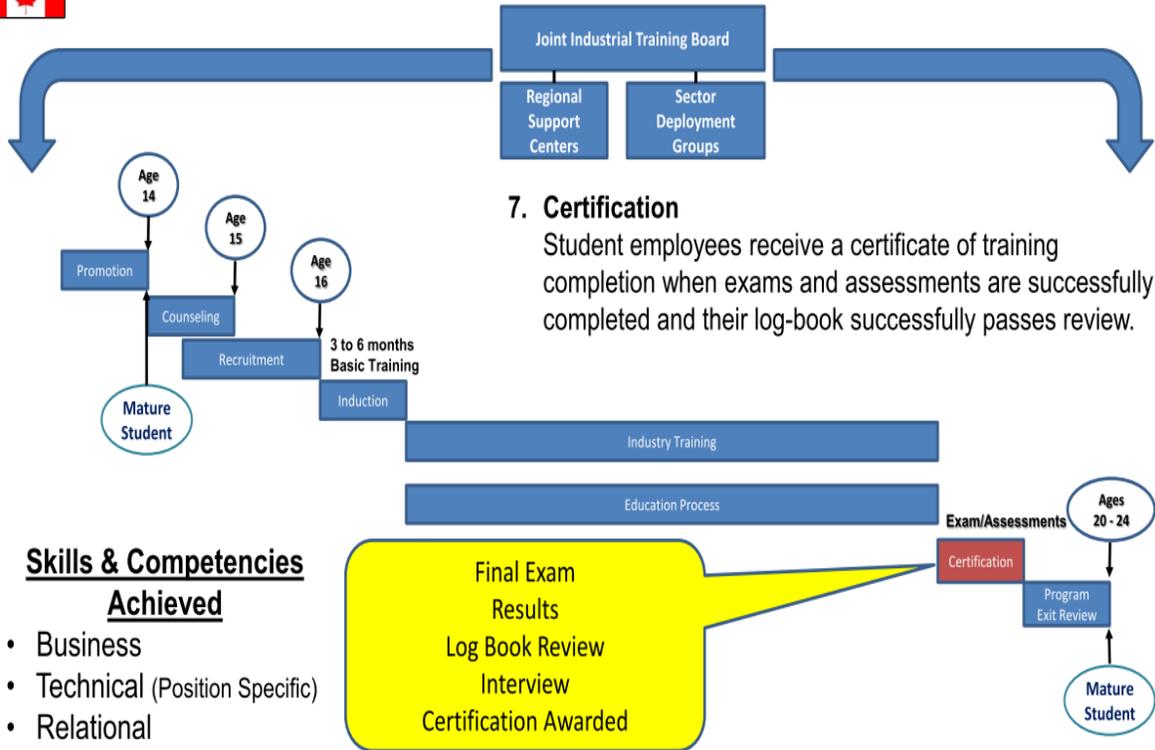
Note: Regular reviews and re-grading gates are built into the system so that performance will be monitored and re-grading undertaken via a corrective action procedure allowing re-grading both upward and downward within the system.

7. Certification

Certificate of Apprentice/Apprentice Trained awarded



The Integrated Learning Journey



7. Certification

Student employees receive a certificate of training completion when exams and assessments are successfully completed and their log-book successfully passes review.

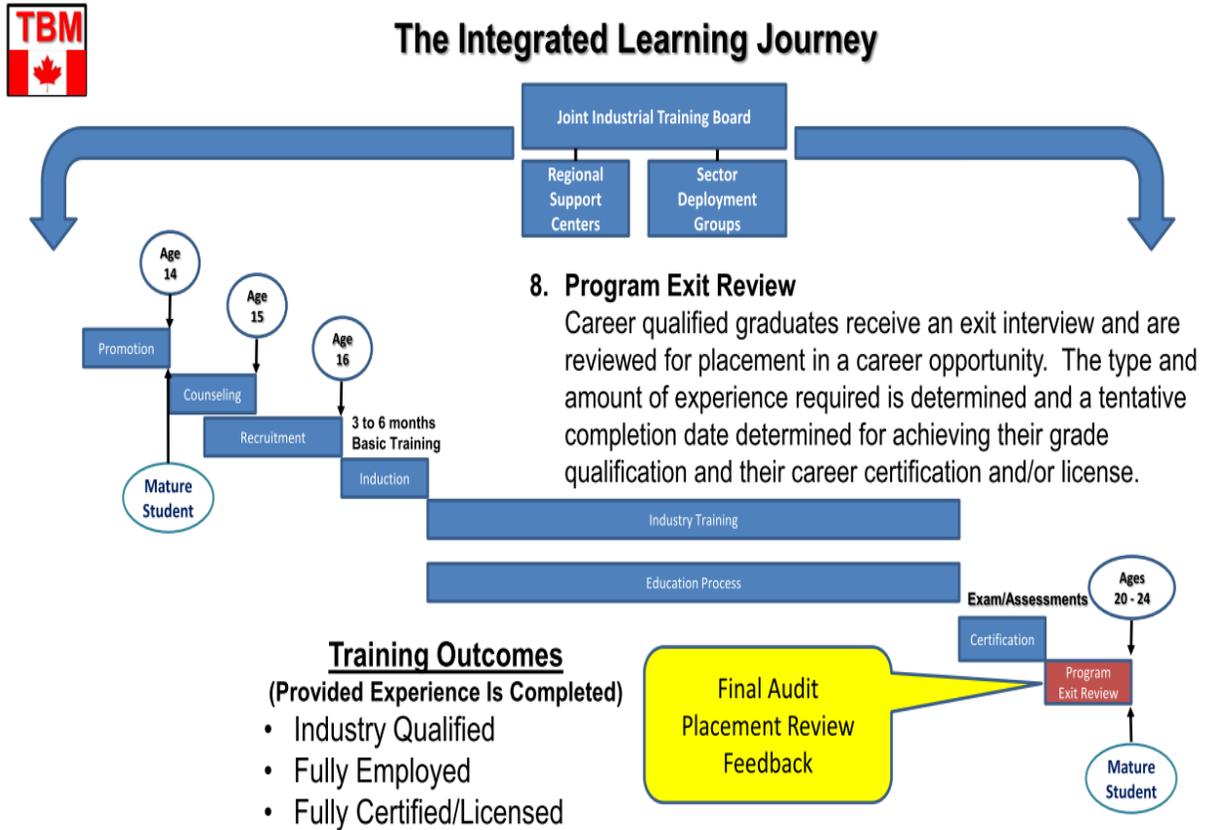
Skills & Competencies Achieved

- Business
- Technical (Position Specific)
- Relational

- The final exam and certification will be awarded by the industry deployment group.
- The review will be coordinated by the regional support centres who will manage the individual apprenticeship files on behalf of the industry sectors.

8. Program Exit Review

Exit interview and review for full time career opportunity



The apprenticeship contract will be closed with a review by the regional support centre representative, the employer and the apprentice to determine the employment plans and any alternative placement effort if needed.

Appendix

I. Vision and Mission Statement

Vision of an Ontario Industrial Training System to Recover Our Lost Skills

Take Back Manufacturing (TBM) is an **SME Forum** lead initiative dedicated to recovery of our manufacturing sectors and the associated prosperity within Ontario and Canada.

(For more on the TBM initiatives go to www.sme-tbm.org)

One of the TBM imperatives is the availability of a future manufacturing workforce that is both well-educated, well-trained and ready for work.

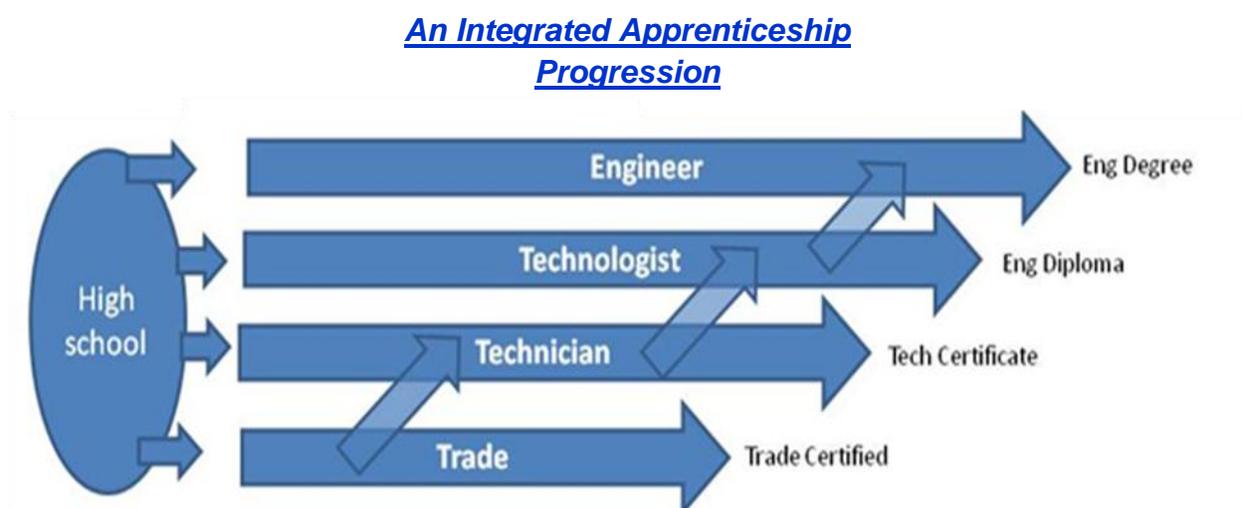
The development of the future workforce has suffered a decline in concert with the decline of the manufacturing sectors and has placed the current skill mix in disarray.

Without significant re-planning and action now, we will experience a drastic and increasing shortage of experience, knowledge and skills when we try to rebirth most manufacturing sectors.

Our Vision

Provide Ontario a World Class Apprenticeship and Technical Training Progression that Leads Ontarians into Rewarding Lifelong Employment and Prosperity

The Plan



Core Values

- We believe Ontario is still the place for recreating and employing a highly skilled and competent workforce that can compete and succeed against any other world workforce
- We believe, utilizing proven apprenticeship and training methodologies, we can reduce program delivery risk and improve apprenticeship skills outcomes and completion rates

Our Mission

Based on our assessment of what it will take to upgrade our future workforce in Ontario we believe an “*Integrated Industrial Learning System for Ontario*” will achieve the following defined Mission:

- 1. Set up an integrated and scalable apprenticeship program of academic and technical education, along with workplace experience and skills that delivers the necessary workforce desired by industry.*
- 2. Only through the shared support and participation of our industry, our education and training institutions, and the 2 levels of government, will this program be economically viable and mission sustainable.*

The success of our mission will occur when the following **Mission Objectives** are satisfied:

- 1. Develop an industry recognized skills and education development progression that Ontario industry leads in owning and installing.**
- 2. Create a program that enlists an apprenticeship pool that enables apprentices to become the best, the brightest and the most talented trained professionals, from all sectors of Ontario society.**
- 3. Seek motivated, hard working and enthusiastic high school students, and workforce members to apprentice and participate in a learning/occupation destination of choice, establishing a lifelong progression in learning and professional requalification.**
- 4. Provide an integrated career pathway that delivers a fully qualified technology manager and/or technology practitioner at each certification step.**
- 5. Provide apprenticeship courses that are fully transferrable and articulated to post secondary colleges and universities and are transparent and at least cost to all apprentice and training participants.**
- 6. Operate the “*Integrated Industrial Learning System*” as a forum and cooperative, open to integrating and incorporating existing industry and industry associations, labor organizations, professional associations and societies, three levels of government, and both public and private education and training institutions and organizations.**
- 7. Encourage and enlist knowledgeable and experienced industrial professionals to lead, manage, and support the transformation.**

II. Types of Work Integrated Learning

Current Work-Integrated Learning in Ontario’s Postsecondary Sector

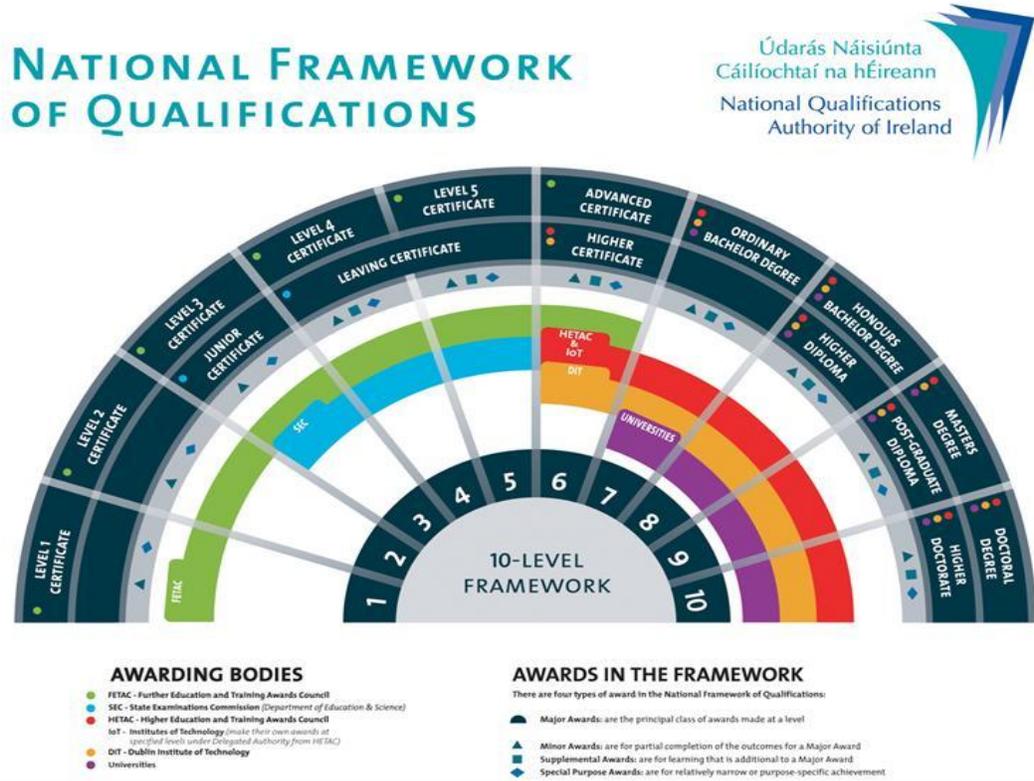
Work-Integrated Learning and Postsecondary Graduates: The Perspective of Ontario Employers

Table 1
Typology of work-integrated learning

	Systematic Training (workplace as the central place of learning)	Structured Work Experience (familiarization with the world of work within a PSE program)				Institutional Partnerships (PSE activities/programs to achieve industry or community goals)	
	Apprenticeships	Field Experience	Mandatory Professional Practice	Co-op	Internships	Applied Research Projects	Service Learning
Definition	Training that combines learning on the job with classroom instruction, leading to a certificate of apprenticeship	Practical experience in a real work setting	Work hours needed to obtain a license to practice or professional designation – or to register with a regulatory college/professional association	Academic study that alternates with paid work experience developed and/or approved by the college/university	Program-related experience in a professional work environment	Student projects to address specific business or industry problems	Student projects to address identified community needs or global issues
Main educational purposes	<ul style="list-style-type: none"> • Workforce training • Skill acquisition • Skill mastery • Workplace literacy 	<ul style="list-style-type: none"> • Application of theory to practice • Attainment of professional or work-related competencies • Workplace literacy 	<ul style="list-style-type: none"> • Integration of theory and practice • Attainment of professional competencies • Professional socialization • Mandatory for professional certification/licensure • Mandatory for institutional program accreditation 	<ul style="list-style-type: none"> • Integration of theory and practice • Career exploration and development • Progressive skill acquisition • Professional socialization • Workplace literacy • Workforce readiness 	<ul style="list-style-type: none"> • Integration of theory and practice • Personal development • Career exploration and development • Skill development • Professional socialization 	<ul style="list-style-type: none"> • Application of theory to practice • Address specific industry needs • Skill development (problem solving, critical thinking) 	<ul style="list-style-type: none"> • Integration of theory and practice • Address specific community needs • Community building • Civic engagement • Global citizenship • Career exploration and development • Skill development • Personal development
Modes of delivery	<ul style="list-style-type: none"> • Worksite • FT employment <p>In-school</p> <ul style="list-style-type: none"> • Block release (alternating with employment) • Day release (concurrent) 	<ul style="list-style-type: none"> • Block placement (alternating with academic program) • Defined number of hours per term (concurrent) • Simulated work activities (concurrent) • Virtual work activities (concurrent) 	<ul style="list-style-type: none"> • Block placement (alternating with academic program) • Defined number of hours per term (concurrent) • Single block placement, often at end of program (capstone) • Simulated work activities (concurrent) 	<ul style="list-style-type: none"> • Block placement (alternating with academic program) • Structured work-study sequence must end with academic semester 	<ul style="list-style-type: none"> • Single block placement at end of program (capstone) • Single block placement (alternating with academic program) • Defined number of hours per term (concurrent) 	<ul style="list-style-type: none"> • Course-based projects (concurrent) • Institutional research projects (concurrent) 	<ul style="list-style-type: none"> • Can be delivered as field experience, co-ops, internships or applied research projects

III. New Apprenticeship Systems

Ireland:



For further information consult: www.nqai.ie www.nfq.ie www.qualrec.ie

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For more information on how Ireland is integrating its learning pathways, consolidated under one QQI program in November 2012, go to:

<http://www.qqi.ie/Qualifications/Pages/default.aspx>

United Kingdom:

Which way into Engineering?

ROUTES TO AN ENGINEERING CAREER

Use this chart to help you map out your career path into engineering.

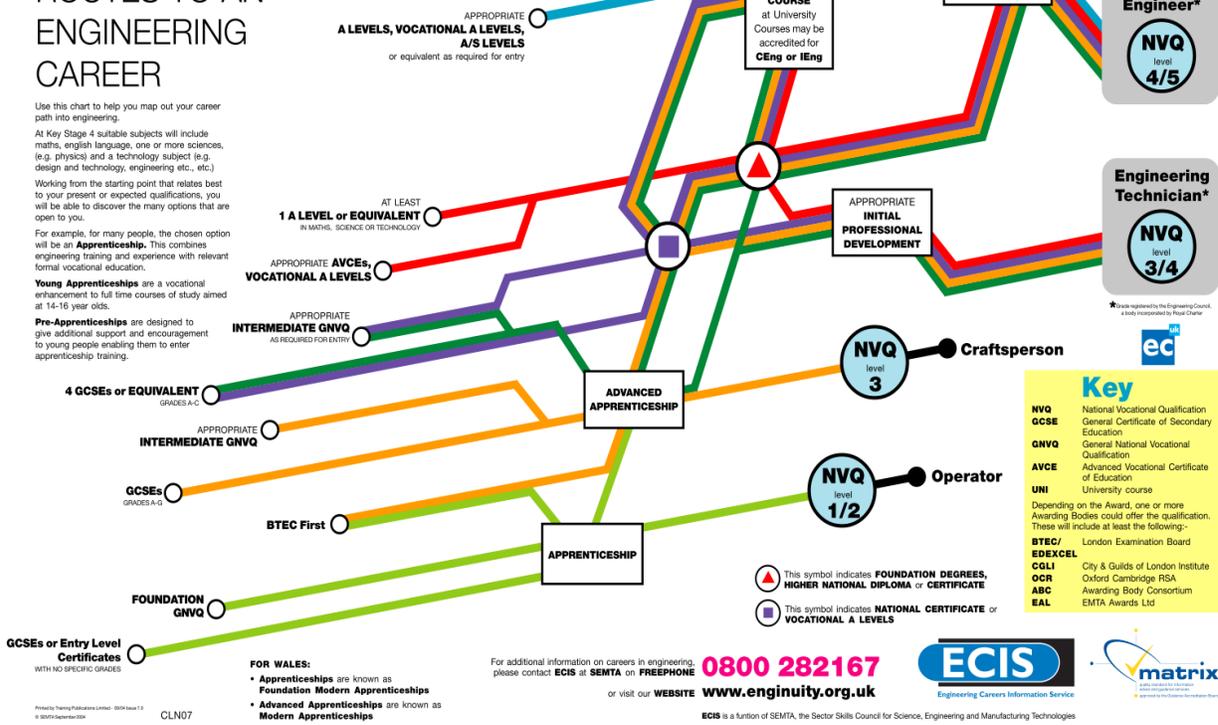
At Key Stage 4 suitable subjects will include maths, english language, one or more sciences, (e.g. physics) and a technology subject (e.g. design and technology, engineering etc., etc.)

Working from the starting point that relates best to your present or expected qualifications, you will be able to discover the many options that are open to you.

For example, for many people, the chosen option will be an **Apprenticeship**. This combines engineering training and experience with relevant formal vocational education.

Young Apprenticeships are a vocational enhancement to full time courses of study aimed at 14-16 year olds.

Pre-Apprenticeships are designed to give additional support and encouragement to young people enabling them to enter apprenticeship training.



For more information about the new UK national apprenticeship implementation plan and trailblazer guidance, rolled out in October 2013, go to:

<http://www.cityandguilds.com/courses-and-qualifications/apprenticeships/apprenticeship-implementation-plan>

IV. Recognition and Training System (Ontario Aerospace Council)



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A Recognition System and Learning Processes for Training and Development of Employees in Advanced Manufacturing Sectors in Ontario

Introduction

The issues and challenges reported by Ontario's advanced manufacturing firms – including those in aerospace and space – in getting enough people with the right knowledge and skills at the right time in the right place are quite clear and haven't changed substantially for many years.

It's also clear that our current approaches to meeting those challenges have been less effective than we want and need. We have too many open positions while at the same time having many people unemployed. We recruit skilled workers from other countries while not leveraging the existing knowledge and skills of people here and not bridging their gaps in knowledge and skills efficiently. Employers state that new graduates are not as fully job-ready as they would like and companies must spend time – often months and sometimes years – to cultivate required workplace knowledge and skills. At the same time, our educational partners struggle to add to already full programs of learning.

None of this has changed markedly for the better over the past many decades.

We should not expect much improvement without different concepts and methods.

We need a different way for cultivating the people and skills we need in advanced manufacturing through effective, reliable learning processes for training and development of employees

We need:

- 1. A system for recognizing learning achievements by employees that:**
 - a. is defined by industry, based on required competencies (knowledge, skills and abilities)
 - b. supports their company advancement and career development through connected pathways for learning progress (ladders and bridges)



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2. Learning processes for employees that are:

- a. based on competencies (knowledge, skills and abilities)
- b. driven by outcomes (acquired competencies)
- c. reliable across all learning organizations
- d. delivered in partnership between industry and our educational partners
- e. delivered in modular, accessible ways, using modern learning technologies

Here is a detailed explanation of each of such a recognition system and learning processes:



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1. A System for Recognizing Learning Achievements by Employees

a. Defined by industry, based on required competencies

Competencies are what people know and are able to do – their knowledge, skills and abilities.

Industry must take the responsibility for defining the required set of positions within advanced manufacturing organizations and for specifying the knowledge, skills and abilities that are necessary for each position in order that it be performed well.

In practice, competencies can usefully be described in three categories, using standardized definitions from an industry-defined Competency Dictionary (see Appendix A):

- Technical Competencies (position specific)
- Business Competencies
- Relational Competencies

A ‘competencies-based’ system defines positions/jobs in advanced manufacturing companies in terms of what competencies (knowledge, skills and abilities) are required for these positions/jobs, as opposed to the conventional approach of defining tasks and responsibilities for jobs/positions.

Two examples of competencies-based Position Profiles are provided in Appendix B (Director of Business Development) and Appendix C (Manufacturing Engineering Technician).

Each company can augment the standard profile to suit its own company situation and job requirements.

b. Connected pathways for learning progress (ladders and bridges) to support company advancement and career development of employees

In the workplace, we need an approach that offers both companies and employees a valid, objective, structured framework to recognize – using competencies – the progressive levels of expertise and experience required for increasing levels of responsibility in the company, and to recognize the relatedness of many positions within the organization. The objective is to enable people to move up career ‘ladders’ within a specific discipline or functional area and to have ‘bridges’ to shift to other related disciplines or functional areas, with full recognition of their experience – their achieved knowledge, skills and abilities.

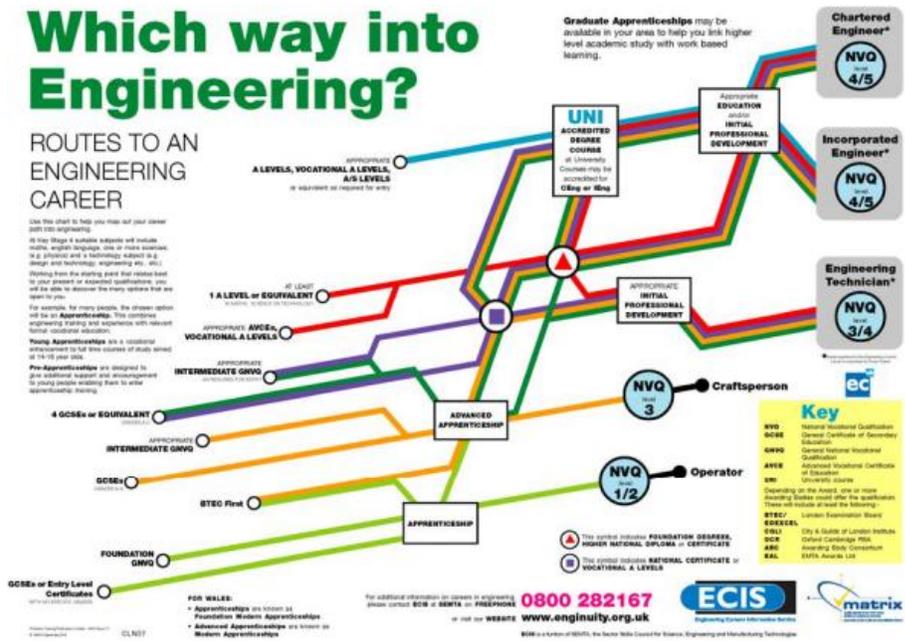
Such a framework would also enable companies to align new entrants – from other companies, other sectors, or other countries – with job positions so that their actual experience (achieved knowledge, skills and abilities) are fully recognized and utilized.



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Industry must take responsibility for establishing the required framework of industry positions, with connected pathways for learning progress (ladders and bridges), to enable companies and employees to see paths for advancement within companies and clear, flexible career progressions. Such a recognition system also supports easy mobility and effective transferability of experienced people between companies, sectors and countries.

The following diagram shows a 'ladders and bridges' framework in an educational environment – the UK technical trades and engineering education system.



In the Ontario advanced manufacturing industry, we would have a 'ladders and bridges' framework that would define the progression from, for example, Junior (entry-level) Manufacturing Engineering Technician to Intermediate Manufacturing Engineering Technician to Senior Manufacturing Engineering Technician, and we would be able to identify the relatedness of a Manufacturing Engineering Technician



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position to that of, say, a Quality Engineering Technician position – specifically and reliably, using a competencies-based approach. Clearly, there are some commonalities in terms of the required competencies for both of those positions and there are also differences.

With a clear definition of both the common competencies and the unique competencies in each position in the framework, employees can be assigned, promoted, trained and developed with confident expectation of excellent job performance and high job satisfaction.

2. Learning Processes for employee training and development

a. Based on Competencies

Industry must state what a well-performing employee in a particular position must know and be able to do – the knowledge, skills and abilities required to perform the job well.

In practice, the same competency-based profile that was used to define the industry positions framework for recognition purposes will be used to specify the required competencies to be learned. In each profile, competencies can usefully be described in three categories, using standardized definitions from an industry-defined Competency Dictionary (see Appendix A):

- Technical Competencies (position specific)
- Business Competencies
- Relational Competencies

These ‘required competencies’ become the specification of requirements to which educators are tasked to respond.

This will ensure that learning programs are well connected to employer needs.

b. Driven by Outcomes

Measurement of the results of the learning processes applied will be determined solely by outcomes achieved – has the learner acquired the required competencies at a satisfactory level? This is not a Pass/Fail system – if the answer to the assessment question is ‘No’, then the employer and the learning organization must define further plans to achieve a ‘Yes’ result.

An outcomes-based approach means that there will be no curriculum advisory groups and no curriculum review and approval process by industry. Measured results (outcomes) are the sole gauge of learning effectiveness.

This approach empowers learning organizations to be as creative as they can be in devising ways to enable learners to acquire the required competencies, and to shorten times required and reduce



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training costs as a result. Each learning organization can strive to differentiate itself in terms of effectiveness, while assuring that learners achieve the required knowledge, skills and abilities.

c. Reliable across all learning organizations

Measurement of the results of learning processes must be done objectively and must be consistent across all learning organizations, so that employers can rely on an affirmation that required competencies have been achieved by an employee at a satisfactory level, regardless of the specific training institution that delivered the training.

Such objective, consistent measurement must be done by an agency/system that is independent of both industry and educators.

d. Delivered with active collaboration between industry firms and educational institutions

For much technical training, the equipment required is expensive to acquire and expensive to sustain at a state-of-the-art level. CNC machining centres are a good example. Industry firms are constantly acquiring new, more modern CNC machining centres as a normal part of their business in order to keep competitive. It is entirely feasible to make use of a company's equipment for training employees, giving them access to the latest technology without the need for the educational institution to invest in that type of equipment. Some advanced manufacturing companies are already doing this, with great success.

Similarly, learning of good business practices, workplace routines, etc. should be delivered by those who are expert in these aspects – industry firms. (Of course, they must be trained to have sound pedagogical techniques and methods.)

Ensuring that the best existing resources are applied in the learning processes will bring a highly efficient and effective learning approach and will reduce costs significantly.

e. Delivered in modular, accessible ways, taking full advantage of modern learning technologies

Training and development for most employees is more about filling important gaps in their knowledge, skills and abilities rather than having them complete an extensive set of courses or full programs.



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As a consequence, the number of trainees needing particular training at any one point in time will be small, and their time available for learning is always limited. Therefore, it will be essential for employees to have access to learning that is modular and accessible at their desk or in their work situation, for small chunks of time, in addition to more conventional training methods.

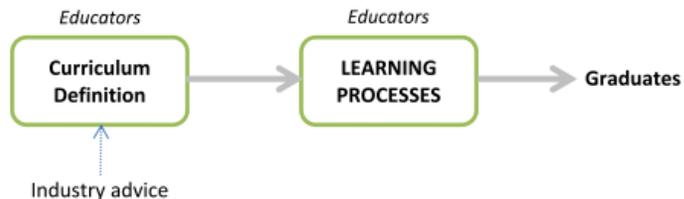
Modern technologies, such as simulations, gaming, smartphones, etc., offer tremendous potential for such highly effective learning processes.

The Required System for Learning Processes for Employee Training and Development

Here is a comparison between our current system for directing and managing employee training and development and the required recognition and learning process system we are proposing and strongly recommending.

Current System for Training & Developing Employees

Most often, learning programs are defined largely by educators on the basis of advice or guidance (via consultations, advisory groups, etc.) from industry representatives, often using curricula as the medium of discussion. This is, in effect, a conversation on the ‘how’ of learning – a domain in which industry people are not knowledgeable – not on the ‘what’ of learning – which is the domain in which industry people are knowledgeable. Moreover, there is no objective, consistent measurement of the outcomes achieved – what students or employees actually know and are able to do as a result of their learning.



The Required System for Training & Developing Employees

A classical, proven, sound design process involves: specifying requirements, as the start point, and verifying that the requirements have been achieved, as the end point.

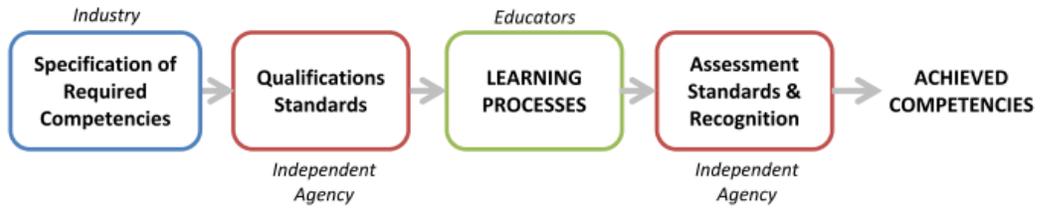
Learning processes must achieve the required competencies. Success must be reliably verified, by objective, consistent and independent means.

Integrated Industrial Learning System for Ontario



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The required system for training and developing advanced manufacturing employees is as follows:



VI. Ontario's Workforce Shortage Coalition

The Coalition has been recommending that government support the increase in experiential learning in the workplace, including apprenticeship; ***“Employer Focused Education for a World-Leading Economy”*** (Recommendations that are similar to our “Integrated Industrial Learning System” recommendations are highlighted in **blue**)

- ***Create a culture of pride in employment-focused education and in all careers that support a prosperous, productive economy.***
- ***Adopt a comprehensive, streamlined, client-centred workforce training model to ensure that all Ontarians can acquire the skills they need to compete in a dynamic, knowledge-focused labour market.***
- ***Ontario's workforce training strategy must provide workers with opportunities to upgrade their skills through all stages of their careers.***
- ***Ensure post-secondary graduates in applied programs of study have credentials that recognize their world-leading competencies.***
- ***Encourage more effective credit transfers across the post-secondary sector to reduce student and government costs while addressing skills gaps more quickly and effectively.***
- ***Reach out to non-traditional students, such as Aboriginal Peoples, with an integrated, stable, and adequately resourced framework for funding appropriate programs and services.***
- ***Develop an immigrant selection strategy linked to labour-market objectives, and improve recognition of newcomer credentials.***
- ***Accelerate improvements to the regulatory and fiscal framework for applied education to meet the real-time demands of an advanced economy.***

Other discussion points of interest from the Coalition

“To create a culture of pride in employment-focused education and in entrepreneurship that will lead to all employees having the skills to function effectively in Ontario's dynamic, skills-based economy, Ontario's Workforce Shortage Coalition recommends that the government adopt the following skills goals:

- ***All high school students should have the opportunity to engage in applied technical, business and/or entrepreneurship education, with direct exposure to workplace environments and applied post-secondary programs, including apprenticeships.***
- ***All teachers should complete a training module enabling them to understand and communicate to students the opportunities that employment-focused education offers students in the modern entrepreneurial economy.***
- ***Thirty-five per cent of employees should participate in training each year, including apprenticeship and essential workplace skills.***

- *There should be a substantial increase in the number of individuals from underrepresented groups with post-secondary credentials.*
- *The government should annually report publicly on its success in achieving these goals in a manner that is similar to its publication of high school completion statistics.*
- *Delegate full operational responsibility, including block funding, to apprenticeship trainers to enable them to market to and register employers and students.*
- *Set a target rate of 70 per cent for apprenticeship completion, annually publish progress and implement initiatives designed to eliminate any shortfall.*
- *Remove the regulatory barriers prohibiting and/or delaying colleges from taking full responsibility (as is the case for universities) for offering three-year degrees and four-year honours degrees in applied subjects that meet a strong market test: competencies demanded by local employers and students, and overarching, regularly audited quality standards as set by the province and relevant national and international bodies.”*

Letter to Premier Kathleen Wynne; Report from Closing the Skills Gap, November 2013