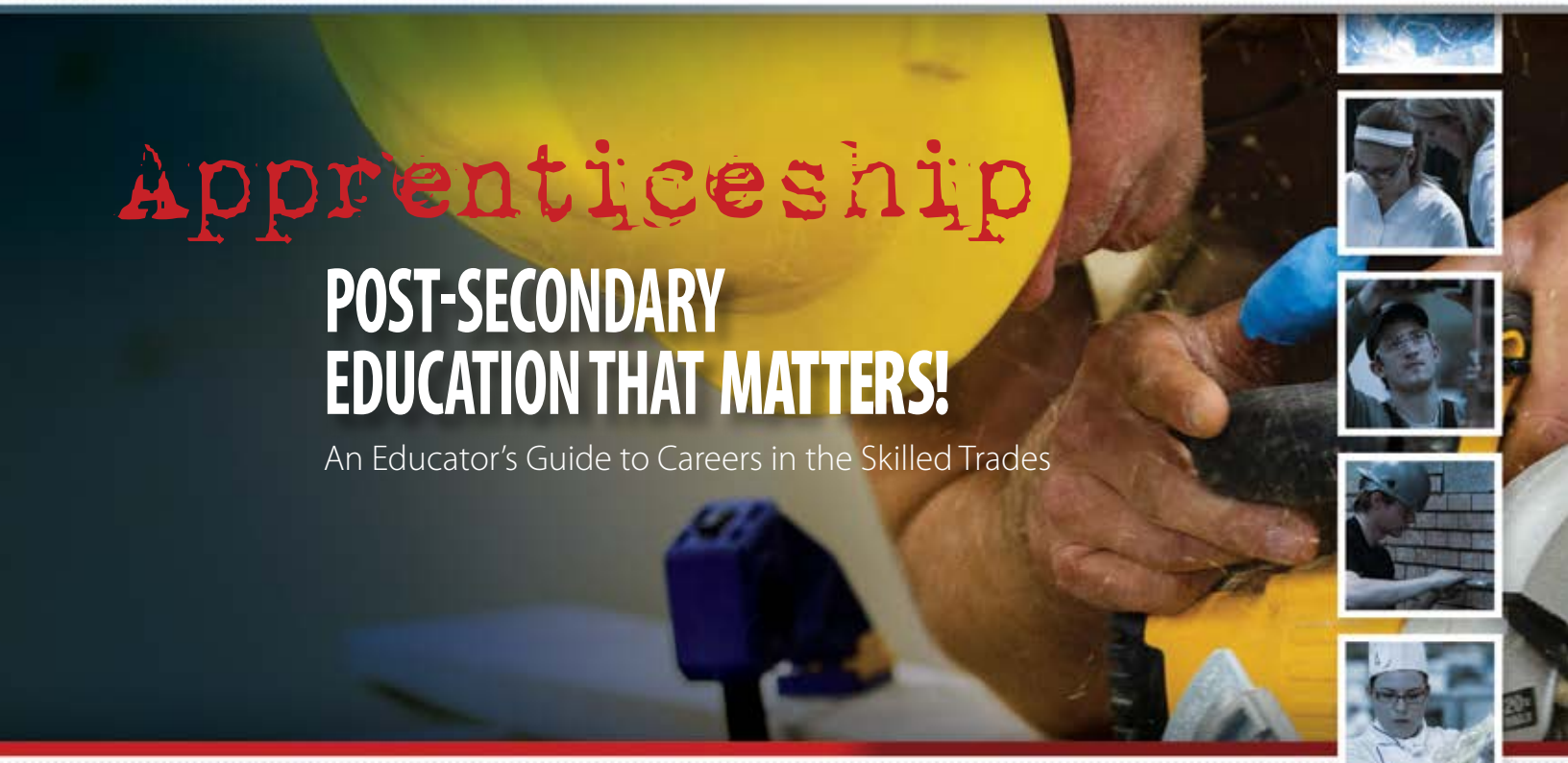
Apprenticeship

POST-SECONDARY EDUCATION THAT MATTERS!

An Educator's Guide to Careers in the Skilled Trades



Canadian Apprenticeship Forum
Forum canadien sur l'apprentissage

Skills Compétences Canada

Apprenticeship

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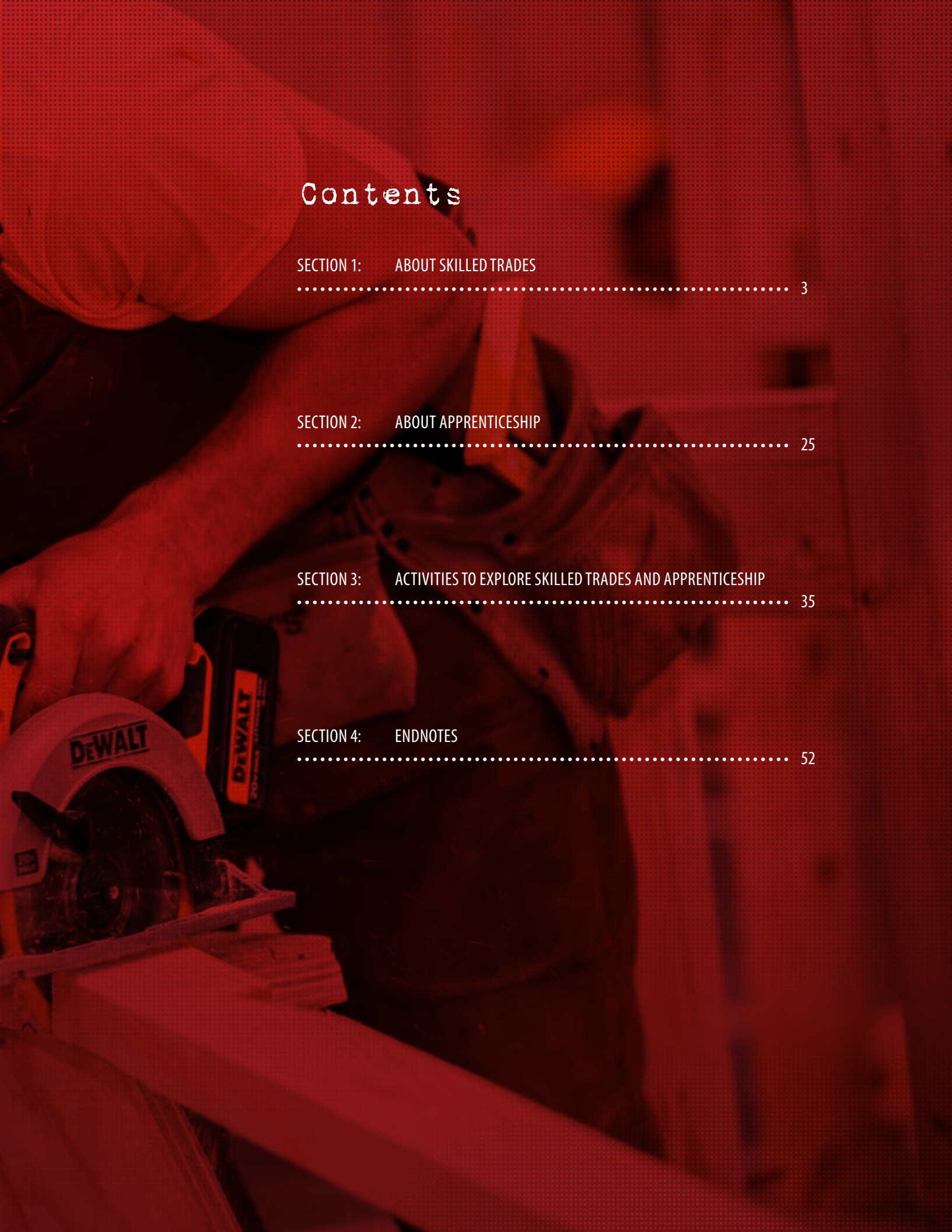
About the Canadian Apprenticeship Forum

The Canadian Apprenticeship Forum-Forum canadien sur l'apprentissage (CAF-FCA) is an inclusive national body that brings together all players in apprenticeship training. A national, not-for-profit organization working with stakeholders in all regions of Canada, CAF-FCA influences pan-Canadian apprenticeship strategies through research, discussion and collaboration – sharing insights across trades, across sectors and across the country – to promote apprenticeship as an effective model for training and education.
Find out more about us at www.caf-fca.org.

About Skills/Compétences Canada

Skills/Compétences Canada (SCC) is a national, not-for-profit organization that actively encourages and supports a coordinated Canadian approach to promoting careers in skilled trades and technologies to Canadian youth. Along with our private sector partners, we are helping to secure Canada's future skilled labour needs. Since its inception in 1989, SCC has evolved into a Pan-Canadian organization offering skilled trades and technology competitions at the regional, provincial/territorial, national and international levels as well as other awareness programs for thousands of young Canadians.
Find out more about us at www.skillscanada.com.



Contents

What is an Apprenticeship?

Apprenticeship is a form of work-based training. Approximately 80% of the training is done on-the-job with an employer and the other 20% is completed in school, in most cases alternating between the two. Apprenticeship programs are typically four years long and lead to trade certification. This form of training has a number of advantages -- apprentices earn while they learn, can access federal grants, are exposed to practical, hands-on learning, and enjoy job opportunities in every region of Canada. Most apprentices are also eligible to receive Employment Insurance benefits while they're in school.

"Canada could need as many as 3.9 million skilled trades workers by 2031."

Rick Miner, "Jobs of the Future: Options and Opportunities." March 2012.

As an educator, there are many reasons to talk to your students about careers in skilled trades...

RESPECT

Skilled trades are respected because of the important role they play in our economy and society. Think about it, they touch almost every aspect of our lives, from the homes we live in, to the cars we drive, to the food we eat. Much of Canada's productivity depends on the highly specialized expertise of tradespeople. It's no surprise they are in high demand from coast to coast to coast.

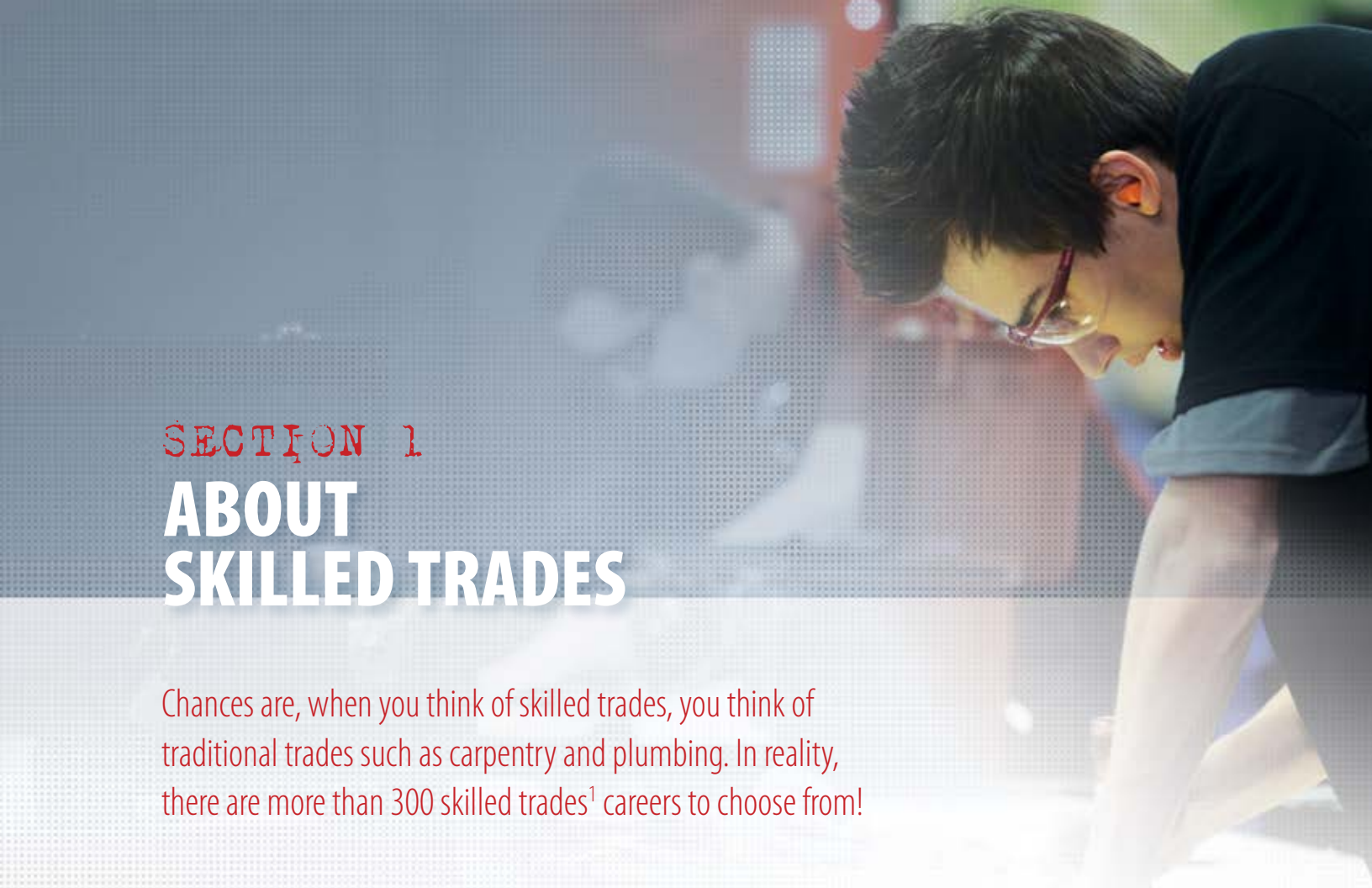
CAREER OPPORTUNITIES

With over 300 careers to choose from, there is a skilled trade for every aptitude and interest. The learning never stops. After receiving their certification, many tradespeople move into management positions or teaching careers. Others start their own business or go back to school to further specialize. In terms of professional development, the sky is the limit!

GOOD PAY

People in skilled trades are rewarded for their efforts with good pay, often better than average. In fact, apprentices start making money right away during the on-the-job portion of their training. One of the best parts of being a tradesperson is that you get paid well doing work you enjoy.

As an educator, this resource will help you discuss with your students how apprenticeship is an excellent post-secondary option. It includes a lot of information, facts and figures, and classroom activities to engage them. Have fun learning about skilled trades careers!



SECTION 1

ABOUT SKILLED TRADES

Chances are, when you think of skilled trades, you think of traditional trades such as carpentry and plumbing. In reality, there are more than 300 skilled trades[1] careers to choose from!

IN THIS SECTION, WE EXPLORE:

- how skilled tradespeople affect our daily lives
- how the retirement of workers will mean enormous opportunities in skilled trades in the future
- the myths and realities of careers in skilled trades
- the diversity of careers in skilled trades
- the traits and talents of successful tradespeople
- the career path of tradespeople

"Canada was built on those very skills of building bridges and roads and telecommunications networks; the skills that bind a large country together."

Len Crispino, Ontario Chamber of Commerce, quoted in *The Challenge Ahead: Averting a Skills Crisis in Ontario.*

Skilled Tradespeople Touch Every Aspect of our Lives

Where would we be without the skills and knowledge of tradespeople?

Think about it. They build and maintain the homes, infrastructure, services and amenities we use every day – from the moment we get out of bed in the morning, until we go back to sleep again for the night. It is no wonder tradespeople are so proud of their skills! Here are just a few of the tradespeople whose work you may have come across today.

You woke up this morning in a comfortable bed, turned on the lights, and began preparing for your day.

- Roofer
- Carpenter
- Brick and Stone Mason
- Drywaller
- Floorcovering Installer
- Painter and Decorator
- Insulator
- Gasfitter
- *and more!*

You drove to school in a safe and reliable vehicle.

- Electric Motor System Technician
- Electrician
- Machinist
- Millwright
- Welder
- Industrial Instrument Mechanic
- Motor Vehicle Body Repairer
- Automotive Painter
- Automotive Service Technician
- *and more!*

You made your way to class, ready to challenge young minds.

- Concrete Finisher
- Roofer
- Carpenter
- Lather (Interior Systems Mechanics)
- Industrial Plumber
- Heating and Ventilation
- Sprinkler System Installer
- Welder
- Refrigeration and Air Conditioning Mechanic
- Crane and Hoisting Equipment Operator
- *and more!*

The Skills Shortage is REAL!

There is currently a shortage of skilled tradespeople in many regions and sectors throughout Canada. The demand for tradespeople is growing rapidly as current workers retire.

"We've got an aging workforce, and that creates skill shortages all on its own. But the demand for tradespeople, engineers and technicians to work on these capital projects, and then all the supply base to support them - that's where the big challenge lies."

Jayson Meyers, Canadian Manufacturers and Exporters Association in light of the organization's 2011 survey that determined capital projects for that year totalled $85 billion, and are forecasted to double by 2015. http://www.workingin-canada.com/news/37859/canadas-skill-shortages-desperate

SOME RECENT HEADLINES TELL THE STORY.

FINANCIAL POST

SKILLED TRADES TALENT SHORTAGE
IS NEXT CRISIS FOR CANADIAN BUSINESSES

Financial Post. September 2012.

Canadian MANUFACTURING

CANADIAN MANUFACTURERS
EXPECT SKILLS SHORTAGES: REPORT

Canadian Manufacturing. October 2012.

POSTMEDIA NEWS

SKILLED TRADE CAREER OPPORTUNITIES
ABOUND IN RESOURCE SECTOR

Postmedia News. June 2012.

THE GLOBE AND MAIL

LOOKING FOR A JOB?
WHY YOU SHOULD CONSIDER A TRADE

The Globe and Mail. February 2013.

SKILLED TRADES DEFICIT COLLIDING
WITH ENERGY BOOM

The Globe and Mail. February 2013.

CBC news

TRADES SHORTAGE COULD LIMIT CONSTRUCTION BOOM

CBC News – Nova Scotia. August 2012.

RETHINK URGED ON SKILLED TRADES' VALUE

Postmedia News. June 2012.

LABOUR SHORTAGE BECOMING 'DESPERATE'

The Globe and Mail. February 2013.

CALGARY HERALD

30% OF CANADIAN BUSINESSES FACE
A LABOUR SHORTAGE: CIBC

Calgary Herald. December 2012.

EDMONTON JOURNAL

LAMPHIER: FINDING SKILLED WORKERS A TOUGH JOB
ALL OVER THE WORLD, NOT JUST IN ALBERTA

Edmonton Journal. November 2012.

580 CFRA NEWS TALK RADIO

FEDS CALL FOR MORE SKILLED TRADES WORKERS

CFRA News. November 2012.

MYTHS AND REALITIES of Skilled Trades

MYTH 1:
Skilled trades are not for students who get good grades

REALITY!

This is simply not true and is probably the most common misperception about skilled trades. The reality is that skilled trades require individuals with strong essential skills such as reading and writing, math and sciences.

Like university and college, successfully completing an apprenticeship takes intelligence, dedication, focus and hard work. Tradespeople are regularly called upon to perform a range of complex tasks, such as:

- Reading and interpreting blueprints for building an office tower.
- Analyzing various elements (such as weather conditions, weight and distance) while operating a crane situated on a 10-story building.
- Identifying the potential volume of water and its resulting pressure when installing a sewage system for a hospital.

MYTH 2:
A university degree is the only post-secondary education that provides a good future.

REALITY!

Achieving a Certificate of Qualification for a skilled trade is a ticket to a good future. Tradespeople are in demand, earn good pay, have the ability to work across the country and benefit from solid job security. With the imminent skills shortage, increased demand for skilled labour and an aging population, the high demand for tradespeople will not diminish. The facts speak for themselves.

CONSTRUCTION

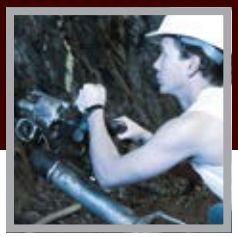
In-migration and a growing population in Manitoba point to the province's projected growth in residential construction by 40% between 2012 and 2016, driving demand for carpenters, plumbers, electricians and plasterers.[2]

Alberta's oil and gas sector will attract considerable investments in non-residential construction, growing the need for skilled workers across most trade areas and, in particular, boilermakers, ironworkers and structural metal fabricators and fitters, and steamfitters, pipefitters and sprinkler system installers.[3]

Mining, transportation and utility projects in northern British Columbia will require boilermakers, drillers and blasters, millwrights and pipefitters.[4]

In Ontario's Greater Toronto Area, industrial and utilities projects will lead the call for such skilled workers as construction millwrights and industrial mechanics, boilermakers, electricians, and steamfitters, pipefitters and sprinkler system installers.[5]

First-time new entrants in Nova Scotia's construction industry will not be able to fill expected gaps in labour supply due to retirements and mortality. Further tightening the need for skilled workers are the province's projected growth in non-residential projects and shipbuilding, intensifying demand for boilermakers, electricians, ironworkers and plumbers.[6]



MINING

Newfoundland and Labrador, Nova Scotia and New Brunswick expect shortages of heavy-equipment operators, welders and related machine operators, and construction millwrights and industrial mechanics due to retirements and other replacement needs.[7]

Replacement requirements and mineral refinery activities in Quebec will increase demand for construction millwrights and industrial mechanics, machine operators and heavy-equipment operators.[8]

Among the top ten occupations that Ontario's mining industry will need to hire to replace retiring and other-separation workers are construction millwrights and industrial mechanics, heavy-equipment operators, industrial electricians, and heavy-duty equipment operators.[9] Northern Ontario is also known for its "Ring of Fire" - which is home to major mining projects - securing a high demand for ironworkers, boilermakers and pipefitters.

The expansion of support services activities in the mining industry in Manitoba, Saskatchewan and Alberta are projected to drive up the need for heavy-equipment operators, construction millwrights and industrial mechanics, and welders and related machine operators.[10]

To replace retiring workers, British Columbia's mining industry will need to focus efforts on hiring heavy-equipment operators and heavy-duty equipment mechanics.[11]

At 1.8 per cent, the three Territories have the fastest projected job growth rate of all of Canada's regions, and heavy-equipment operators will be in particularly high demand.[12]

AUTOMOTIVE

In Newfoundland and Labrador, automotive service technicians are among the 50 occupations expected to experience a tight labour market. It is also one of 12 occupations projected to have particularly strong recruitment pressures to 2015.[13]

TOURISM

Seventy-nine per cent of Canadian food and beverage services businesses reported having difficulty hiring cooks.[14]

In Saskatchewan, one of the hardest positions to fill in the food and services industry is cook.[15]

By 2020, British Columbia is expected to be short as many as 400 chefs and cooks.[16]

OIL AND GAS

In British Columbia, Alberta and Saskatchewan, the oil sands sector will need pipefitters, welders, insulators and scaffolders (mining).[17]

Similarly, petroleum services in these provinces will require heavy-duty mechanics, welders, pipefitters, machinists, insulators, instrumentation technicians and scaffolders.

OTHER

As of March 2011 in Ontario, nearly 30 per cent of journeypersons with certificates in voluntary and unrestricted trades were near retirement (55-64 years of age) in comparison to just over 15 per cent of the province's labour force overall.[18]

MYTH 3:
Skilled trades are only seasonal jobs

REALITY!

Many skilled trades jobs are in sectors that offer year-round work, such as mining, forestry, oil & gas, service and manufacturing. And, although it used to be that outdoor infrastructure projects were put on hold until the frost left the ground, now it is quite common to see skilled workers building roads and skyscrapers during the winter months. Although there is no denying that Canada's climate makes it more challenging to be a skilled worker, with today's technology, it is possible to work in all types of weather. For example, new technology enables tradespeople to work all year in the construction trades. Simply adding propane heating and insulated tarps, for example, creates a feasible work environment. Specialty clothing has also helped tradespeople work through the cold winter months.

MYTH 4:
Jobs in the trades are dead-end jobs

REALITY!

Skilled trades offer not just jobs, but careers! There are many chances for advancement within a trade from supervisory positions to management positions, to the possibility of owning your own business. You may even find yourself teaching at a technical training institute or mentoring your own apprentices as a certified journeyperson. The level of advancement reflects the capability and desire of the tradesperson.

MYTH 5:
Skilled trades don't pay well.

REALITY!

The skilled trades offer great incomes!

Many trades provide earnings above the national average. The 2007 National Apprenticeship Survey indicated that 40% of apprentices who had completed their apprenticeship program earned more than $60,000/year, which is higher than the national average of $40,000/year. More than half said they earned between $25 to $50 dollars/hour.[19] There are opportunities to earn even more depending on the trade, position, location and opportunities for advancement.

As an example, the minimum wage payable to tower crane operators in Manitoba is $34/hour.[20] Steamfitters, pipefitters and sprinkler system installers in Alberta averaged a salary of more than $87,000 in 2011.[21] Refrigeration and air conditioning mechanics in the Toronto area earn more than $37/hour.[22] Offshore welders in Newfoundland and Labrador's oil and gas industry earn between $85,000 and $100,000 annually. As of 2011, additional compensation elements such as benefits, yearly bonuses, company shares and RRSPs could increase offshore welders' annual earnings to $100,000 - $120,000.[23]

Not only do tradespeople earn above-average incomes, they also complete their studies without being overwhelmed by debt. By taking an apprenticeship and learning a trade, apprentices can 'earn as they learn', decreasing the amount of debt they may incur during their post-secondary training. In addition, the federal government offers taxable cash grants to eligible apprentices in Red Seal trades, which could amount to $4,000 over the course of the apprenticeship program.[24] Selecting a skilled trades career and taking an apprenticeship makes good financial sense!

MYTH 6:
Skilled trades are dirty and noisy

REALITY!

There is no doubt that many trades involve "hands-on" work. But this is why many people work in trades in the first place! They consider this type of work far more rewarding than a job that requires a lot of desk work.

That said, it is important to remember that technology and new techniques have greatly changed the face of trades. Today, an increasing amount of mechanical equipment is operated with the aid of computer software. Therefore, more and more trade workers work indoors, using sophisticated computer equipment and technology. For example, it's not uncommon these days for an automotive service technician to turn on a computer before sticking his or her head under the hood of a car!

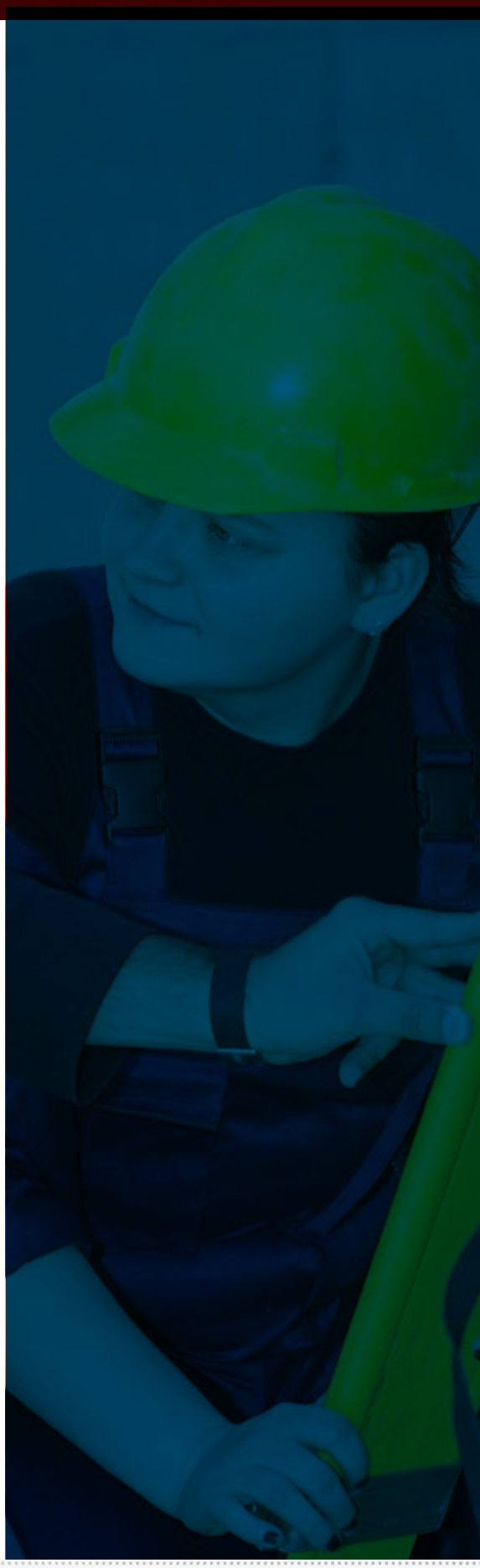
Additionally, legislated health and safety requirements enforce strict regulations on levels of noise and exposure to any hazardous materials on a job site. Finally, employers and unions work together to ensure worker safety by implementing and enforcing additional workplace safety standards.

MYTH 7:
Skilled trades are physically demanding

REALITY!

There is certainly a physical aspect to many trades. For many people, this type of work is more attractive to them than a career that requires a lot of time in an office. However, it is important to clarify that there are a diversity of trades and each has a unique workplace environment. We are more likely to hear tradespeople rave about the creativity and problem-solving challenges of their work than complain about physical demands.

Technology has also changed the nature of many of the trades. People interested in working in the skilled trades need to operate computer software and mechanical equipment that has become incorporated into these jobs.



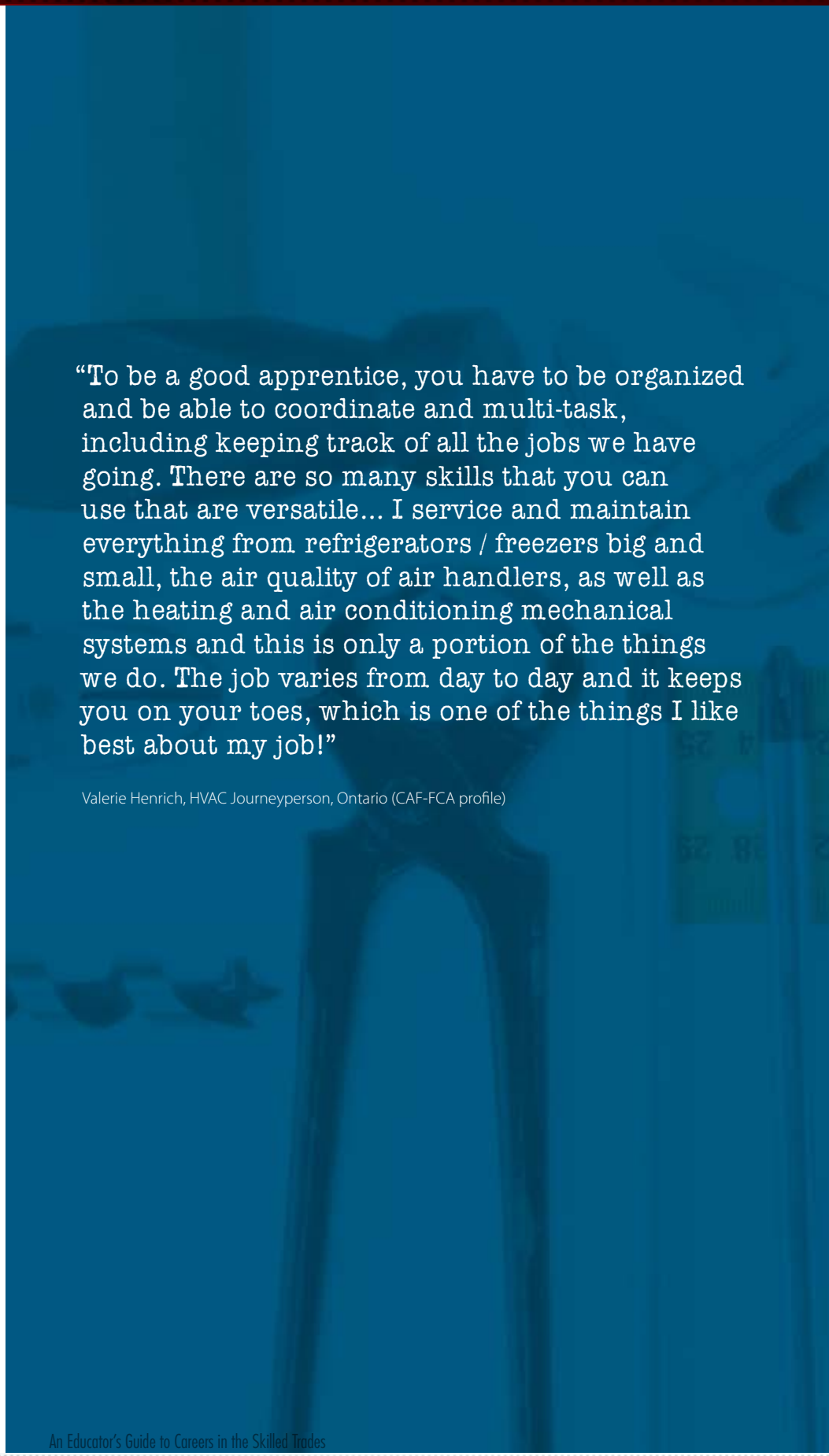
MYTH 8:
Women do not have the physical strength to perform in the skilled trades

REALITY!

Physical work does not rely on physical strength alone. In fact, skilled trades require dexterity, stamina, good hand-eye coordination and balance - all attributes that women and men possess equally.

Some trades that require you to use these strengths include:

- Hairstylists
- Millwrights
- Welders
- Cooks
- Draftspersons
- Bricklayers
- Painter/Decorator



"To be a good apprentice, you have to be organized and be able to coordinate and multi-task, including keeping track of all the jobs we have going. There are so many skills that you can use that are versatile... I service and maintain everything from refrigerators / freezers big and small, the air quality of air handlers, as well as the heating and air conditioning mechanical systems and this is only a portion of the things we do. The job varies from day to day and it keeps you on your toes, which is one of the things I like best about my job!"

Valerie Henrich, HVAC Journeyperson, Ontario (CAF-FCA profile)

Diversity of Careers in the Skilled Trades

With more than 300 occupations to choose from, there is a skilled trade for everyone!

On pages 11-22 of this guide, we have listed the most common trades for which post-secondary training is available across four key industries –manufacturing/industrial, construction and maintenance, motive power/transportation, and service. In addition, we have selected several trades from each sector to profile.

For more information on these and other trades, visit www.careersintrades.ca.

ON THE JOB: MANUFACTURING / INDUSTRIAL

- Automotive Machinist
- Drillers and Blasters
- Graphic Arts (Bindery, Press or Pre-Press)
- Heavy Equipment Operator
- Hoist Operator (Construction, Mobile Crane, Conventional Crane or Hydraulic Crane)
- Industrial Electrician
- Industrial Instrument Mechanic
- Industrial Mechanic (Millwright)
- Industrial Warehouseperson
- Instrumentation and Control Technician
- Lather (Interior Systems Mechanic)
- Machinist
- Metal Fabricator (Fitter)
- Mould Maker
- Power System Electrician
- Power System Operator
- Rig Technician
- Sawfiler/Fitter
- Stationary Engineer
- Tool and Die Maker
- Welder

TOOL AND DIE MAKER

Any ideas about what a tool and die maker does? It may come as a surprise to you, but they are among the most highly skilled workers in the economy. They produce tools, dies and special moulds for the machines that make many of the products and equipment we use everyday, like clothes, airplanes, furniture and even candy. Tool and die makers work from drawings, computer-aided designs, and must have a good grasp of the properties of metal, plastic, rubber and composite materials.

TRAITS & TALENTS

Tool and die makers must be excellent problem-solvers. They must also be good with computers and quickly adapt to technological advances in robotics and lasers. Most tool and die makers have a background in mathematics and physics. The work can be physically demanding.

WORKPLACE

Tool and die makers can be found in a variety of workplace settings. Examples include mould shops, shipyards, refineries, mines, smelters and overhaul shops. Some work in large manufacturing settings that produce motor vehicle parts, aircraft parts, machinery and equipment, and hardware, while others may find employment in small custom shops.

MACHINIST

A machinist is to metal what a carpenter is to wood. They set up and run machines that cut or grind metal and other materials into products with very precise dimensions. Their expertise is usually called upon to make a single part, such as the mechanism that installs windshields on a car assembly line. Their work is forever evolving due to the rapid pace of technological change.

TRAITS & TALENTS

Machinists like working with tools and equipment. They are patient, have excellent hand-eye coordination and manual dexterity. They must also have a background in mathematics and be knowledgeable about the properties of metal, plastic, rubber and composite materials. They must be very safety conscious and in good physical condition.

WORKPLACE

Machinists work in manufacturing settings that make fabricated metal products and machinery, and in machine shops that manufacture transportation equipment. They also work in factories that produce motor vehicle parts, motor vehicles, and aircrafts and parts. Primary steel producers hire machinists, too.

WELDER

Welding involves the joining of metals using manual, semi-automatic and automatic arc welding equipment. Welders generally plan their work from drawings and blueprints and may use hand tools and machines to fabricate, assemble and weld products.

There are many different types of welding depending on the material, equipment and techniques used, the nature of the final product and the degree of expertise required.

Welding can provide a lucrative and rewarding career, with highly transferable skills; it can also offer very diverse work and challenges.

TRAITS & TALENTS

Welders need good hand-eye coordination, manual dexterity and the ability to concentrate on detailed work for long periods of time, often in awkward positions. They must also be able to read and understand blueprints or drawings and to follow instructions precisely.

Knowledge of computerized tools and machinery, analytical ability and communication skills are all important for success in this field. Good math skills are often called upon.

WORKPLACE

Welders find employment with specialized welding and fabricating shops, companies that build ships and aircrafts and other metal products, heavy machinery contractors, and manufacturers of structural steel and platework, as well as boilers. Some welders work on construction sites.

INDUSTRIAL ELECTRICIAN

Electricity, and the systems and processes it powers, are critical to industry. Given its central role, it is no wonder that industrial electricians are so valued in industrial settings. If controls malfunction, an electrical system stops working, or new electrical equipment arrives, industrial electricians are the ones who are called upon to get things running again. With all of the tasks and components involved in electrical systems, an industrial electrician may have as many different tasks in a day as there are hours.

Some of the main tasks include installing, servicing and maintaining electrical components such as light fixtures, wiring and switches; testing and troubleshooting electrical systems using special equipment; and repairing electrical equipment and controls such as generators and pumps. They also record maintenance work that is done on the various equipment and systems to prevent issues from arising, and carefully read and interpret blueprints, drawings and code specifications.

TRAITS & TALENTS

Industrial electricians need to pay close attention to detail and be good at planning since tasks can be very complex, requiring multiple steps and careful interpretation of schematics and drawings. The ability to adapt and work independently or as part of a team is important since some tasks require a group effort to problem-solve. Strong mathematical and analytical skills, mechanical aptitude, and good manual dexterity are other important attributes.

WORKPLACE

Industrial electricians find work in maintenance departments of factories, plants, mines, fabrication facilities, governments and other industrial worksites. Electrical contractors and electrical power companies are other places where industrial electricians will be employed. Work can be done indoors or outside, and may require the electrician to go into confined spaces or access equipment at various heights.

ON THE JOB:

CONSTRUCTION AND MAINTENANCE

- Blaster
- Boilermaker
- Bricklayer
- Cabinetmaker
- Carpenter
- Communications Electrician (Construction Craft)
- Concrete Finisher
- Concrete Pump Operator
- Conditioning Mechanic
- Construction Craft Labourer
- Construction Electrician
- Construction Lineman
- Drywall, Finisher and Plasterer
- Electrician (Domestic and Rural)
- Floorcovering Installer
- Gasfitter -First Class
- Glazier
- Heavy-Duty Equipment Technician
- Heavy Equipment Operator
- Hoist Operator
- Industrial Instrument Mechanic
- Insulator (Heat and Frost)
- Ironworker
- Locksmith
- Metal Fabricator (Fitter)
- Mobile Crane Operator
- Oil Burner Mechanic
- Painter and Decorator
- Plumber
- Power System Electrician
- Power System Operator
- Powerline Technician
- Refrigeration and Air Conditioning
- Roofer
- Sawfiler/Fitter
- Sheet Metal Worker
- Small Engine and Equipment Mechanic
- Sprinkler System Installer
- Steamfitter/Pipefitter
- Tilesetter
- Water Well Driller
- Welder

HEAVY EQUIPMENT OPERATOR

The work of heavy equipment operators is all around us, although we may not realize it. Without the dozers, excavators, tractor-loader-backhoes, articulated haul trucks, loaders and graders handled by trained operators, we wouldn't have the bridges, roads, buildings, airports and other large structures we encounter on a daily basis.

Not only are these skilled tradespersons responsible for operating a variety of heavy equipment, but they are also required to check their equipment pre-operation, conduct basic maintenance such as lubricating components, and keep records to ensure equipment is maintained. Heavy equipment operators are also expected to be familiar with relevant municipal codes and bylaws, highway traffic acts, health and safety acts, and natural gas regulations both for public safety and their own.

TRAITS AND TALENTS

Heavy equipment operators need to have good eye-hand coordination and mechanical aptitude to manoeuvre and maintain the large equipment they use. Alertness and concern about safety are other key traits due to the size and power of the machinery involved in the work. Awareness of surroundings is important since the noise of the equipment can block out the sounds of your environment, and you may need to rely on hand signals, flags or radio communication to get direction on where to move materials or other cargo.

WORKPLACE

Heavy equipment operators work outdoors in a variety of settings. They work on construction sites, in logging areas, on pipelines, and in surface mining and quarrying environments. Construction companies, heavy equipment operators and public works departments are some of the employers of these tradespersons. Depending on the location, employers in the logging, surface mining, oil and gas, and supply chain sectors may also have heavy equipment.

CABINETMAKER

Cabinetmaking involves more than simply designing, building and repairing cabinets. It encompasses working with a variety of structures such as doors, windows and window frames, and all types of furniture. Cabinetmakers must follow blueprints and designer specifications exactly to construct and repair wooden articles. Today, sophisticated equipment, basic woodworking machines, and portable power and hand tools are used to perform many of the job functions.

Cabinetmakers must have a broad knowledge of wood, its structures and properties, and an assortment of cabinetry hardware and materials. A worker with training and education could start in production and work their way up to a supervisory or management position in the wood industry, as the skills are transferable to a number of other professions.

TRAITS & TALENTS

Cabinetmakers like to build things and work with their hands. They should be physically fit and have strong math skills, manual dexterity and good hand-eye coordination. They must also be able to read, interpret and accurately follow blueprints, drawings and other design specifications. What's more, a cabinetmaker's artistic touch and creativity are often as important as their woodworking abilities in the development and design of new products.

WORKPLACE

Cabinetmakers work in all areas of the wood industry. They can be self-employed or employed by furniture manufacturing and repair companies, construction firms or cabinetmaking contractors. Although the jobsite changes from factories to custom shops, nearly all of the work is done indoors in large, well-lit and well-ventilated areas.

PLUMBER

Plumbers install and repair plumbing fixtures and water, waste disposal, drainage and gas systems in residential, commercial and industrial buildings. They read blueprints to determine the layout of a system and measure and mark areas where the pipes will be installed and connected, checking for obstructions such as electrical wiring. Once a project has begun, they perform a number of tasks, from simple installation of pipes and fittings to complex calculations and planning in specialized environments such as hospitals. An important part of their job is to fit the piping into the building with the least waste of materials while maintaining grade or slope and avoiding trapping air or fluids in the system. A plumber's skills are also applicable in maintenance, service work, hydronic heating and medical gas cross connection controls and inspections.

TRAITS & TALENTS

An interest in construction and good math skills are assets for plumbers. They should enjoy working with their hands, performing a variety of tasks and be proficient in using an extensive range of hand tools, powered machines, torches and welding equipment. They must be able to understand and follow detailed plans, and to visualize concepts and entire piping systems. In addition, plumbers must be good problem solvers and able to apply their analytical abilities in a wide assortment of situations.

WORKPLACE

The main area of employment for plumbers is construction, both residential and commercial, working either for plumbing firms or self-employed as sub-contractors. They also find work in the maintenance departments of large institutions such as hospitals or schools. Plumbers are often required to work in cramped areas or at considerable heights, and the work can be physically demanding, as there is a considerable amount of lifting and carrying of piping materials involved.

POWERLINE TECHNICIAN

The work of powerline technicians is critical to the delivery of electricity throughout our communities. People trained in this trade build and maintain electrical power lines and cables, and other related equipment like insulators, conductors, lightning arrestors and transformers. If you've ever lost power during a storm because of a downed power line, these tradespeople are the heroes who restore power. They work underground and at various elevations, always using a range of sophisticated equipment. The work is often performed outdoors, in all weather conditions, and can involve a lot of travel. Some work sites are remote and require travel by helicopter or boat.

TRAITS & TALENTS

Powerline technicians like to work outside and many have a sense of adventure. The job requires people with good mechanical aptitude, the ability to lift heavy objects, and the ability to work at heights in varying extreme climates. They also need to have a sound knowledge of the principles of electricity, power transmission and distribution systems, which are also known as grids. Powerline technicians must be very safety-conscious.

WORKFORCE

Powerline technicians work in the private and public sector. They are generally employed by electric power generation, distribution and transmission companies, electrical contractors and public utility commissions. Technicians can expect to have a 40-hour work week, but may work longer due to extreme weather conditions or extenuating circumstances.

ON THE JOB:

TRANSPORTATION / MOTIVE POWER

- Agricultural Equipment Technician
- Aircraft Maintenance Engineer
- Autobody Repairer
- Automotive Electrical Technician
- Automotive Glass Technician
- Automotive Painter
- Automotive Service Technician
- Heavy Duty Equipment Technician
- Inboard/Outboard Mechanic
- Marine Engine Mechanic
- Motive Power Machinist
- Motor Vehicle Body Repairer (Metal and Paint)
- Motorcycle Mechanic
- Parts Person
- Recreation Vehicle Service Technician
- Small Engine and Equipment Mechanic
- Transport Refrigeration Mechanic
- Transport Trailer Technician
- Truck and Transport Mechanic

AIRCRAFT MAINTENANCE ENGINEER

Aircraft mechanics install, maintain, repair and overhaul aircraft structures and mechanical and hydraulic systems. They must rigorously check and inspect equipment to make sure hazards are prevented and that they meet Transport Canada's standards of performance and safety. Their work typically consists of taking equipment apart, checking it and diagnosing problems, or performing routine maintenance, such as cleaning and lubricating or adjusting valves and seals. An aircraft mechanic may specialize in specific aircraft systems such as engines, airframes or hydraulic systems. With experience, aircraft mechanics may progress to supervisory positions or, if they have an Aircraft Maintenance Engineer's (AME) licence, they may become aircraft inspectors.

TRAITS & TALENTS

Aircraft mechanics need manual dexterity and good hand-eye coordination. Furthermore, they must be in good physical condition, since heavy lifting and climbing may be required. They must also be able to interpret and follow written instructions. An understanding of computerized machinery as well as good communication and analytical skills are very important.

WORKPLACE

People in this field are employed by aircraft manufacturers, maintenance and overhaul organizations, airlines and other aircraft operations. They most often work at airports or repair yards, mainly indoors, in repair shops, plants and other buildings, but many will work outside at least part of the time. An aircraft mechanic cannot be afraid of heights, as they may work on the top of jet wings and fuselages.

AUTOBODY REPAIRER

Autobody repairers make body repairs to cars, trucks and other motor vehicles using traditional hand tools and a range of specialty body repair tools such as cutting torches, soldering equipment, blocks, hammers and spray guns. A career in autobody repair can cover a number of different areas, such as paint and refinishing, body work and frame work, although paint is considered a separate trade. Knowledge of this profession is applicable to many other areas of the automotive sector, and there is a high demand for skilled employees throughout the industry.

TRAITS & TALENTS

Physical fitness and strength, manual dexterity and mechanical aptitude are obvious traits of an autobody repairer. Other characteristics include good analytical and problem-solving skills, good eyesight and colour vision, good interpersonal and customer relation skills, and an interest in computer and electrical work.

WORKPLACE

Autobody repairers can work for car dealerships, independent garages or specialty repair shops. In smaller shops, workers often do both the body repairing and the painting, while in larger shops they may specialize in one type of repair. A career in autobody repair offers a variety of challenges as each damaged vehicle presents a different set of problems. The majority of repairers work under the general direction of a supervisor.

AUTOMOTIVE SERVICE TECHNICIAN

Automotive service technicians make mechanical repairs and carry out scheduled maintenance on cars, trucks and other motor vehicles using a variety of testing equipment and tools. This process customarily involves the use of computerized diagnostic equipment, such as infrared engine analyzers, spark plug testers and compression gauges. New developments in engines, transmissions and suspension systems, and the increased use of electronic components, are changing the mechanic's job into that of a technician, with more emphasis on vehicle diagnosis.

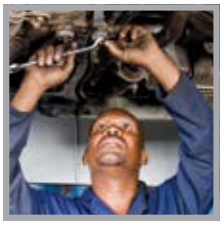
TRAITS & TALENTS

Automotive service technicians should have a genuine interest in cars and mechanics, mechanical aptitude and knowledge of how automobiles work. They also need analytical abilities and problem-solving skills to understand and diagnose malfunctions quickly and accurately. With the introduction of increasingly complex technology, knowledge of computers and electronics is essential.

WORKPLACE

Automotive service technicians are employed in a number of sectors of the economy. Most work in repair shops, at car dealerships and in the service departments of industrial, manufacturing and resource-based companies that have large motor vehicle fleets. Shift and weekend work is sometimes required, as many repair shops are now open late to better serve their clients.

TRUCK AND TRANSPORT MECHANICS



Truck and transport mechanics work on the largest vehicles on the road, such as buses, motor homes, tankers and different types of trucks, including dump trucks, flat beds and pickup trucks. They inspect, troubleshoot, repair, replace and maintain operating systems and components such as chassis and frames, brakes and steering, cab and body, engine and supporting systems, drive train and accessories. There are ongoing changes in the trucking industry that truck and transport mechanics must be aware of and receive further training on. Today, trucks have fewer mechanical parts, more power and are able to carry larger payloads. They are also more electronically controlled, made with lighter and stronger materials and require less servicing.

TRAITS & TALENTS

Truck and transport mechanics are usually in good physical shape and have strong mechanical aptitude and problem-solving skills. They must also be prepared for a career of life-long learning. Mechanics are constantly receiving updated technical manuals and instructions about their occupation. What separates the simply good from the great mechanics is an ability to keep abreast of engineering and technological advances.

WORKFORCE

Truck and transport mechanics can be found in small repair shops, large fleet maintenance companies, public transportation companies and construction companies. They use a variety of tools, equipment and materials. Many trucks are now built with more user-friendly equipment and self-monitoring systems, improving the ability to repair and maintain them.

ON THE JOB:
SERVICE

- Agriculture Dairy/Swine Herdsperson
- Appliance Service Technician
- Arboriculturist
- Automotive Machinist
- Child and Youth Worker
- Community Antenna Television Technician
- Cook
- Early Childhood Educator
- Electric Motor System Technician
- Elevator Constructor and Mechanic
- Food and Beverage Server
- Graphic Arts (Bindery)
- Graphic Arts (Pre-Press)
- Graphic Arts (Press)
- Hairstylist
- Horticulturist (Landscaper-Greenskeeper)
- Industrial Warehouseperson
- Information Technology Network Technician
- Jeweler and Goldsmith
- Locksmith Services
- Meat Cutter Services
- Network Cabling Specialist
- Optics Technician
- Powerline Technician
- Special Events Coordinator
- Stationary Engineer
- Upholsterer

BAKER

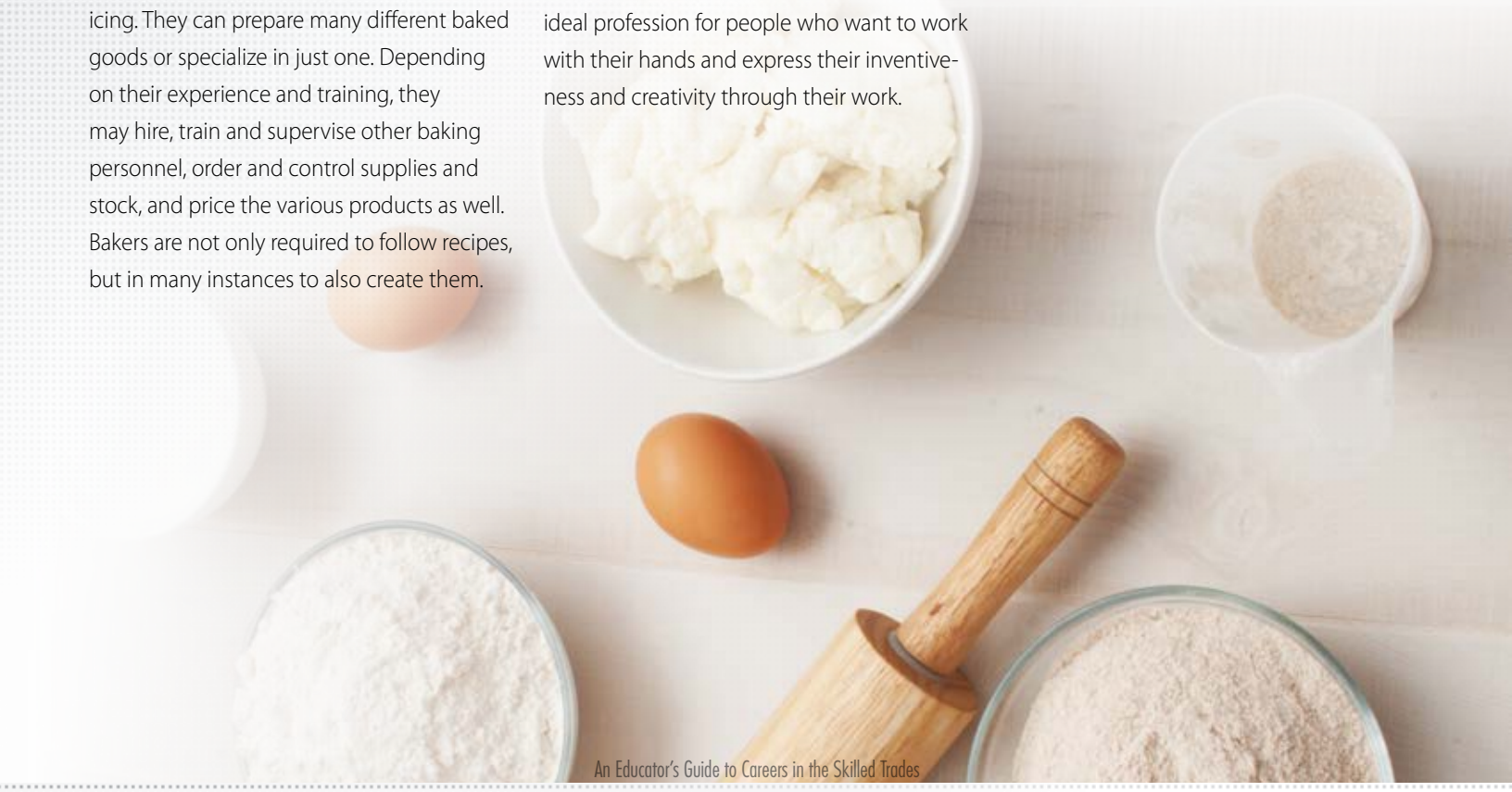
A career in baking offers a variety of areas in which to specialize. Bakers are responsible for making breads, bagels, pretzels, cakes, muffins, cookies and pastries as well as chocolate and candy, sugar sculptures and icing. They can prepare many different baked goods or specialize in just one. Depending on their experience and training, they may hire, train and supervise other baking personnel, order and control supplies and stock, and price the various products as well. Bakers are not only required to follow recipes, but in many instances to also create them.

TRAITS & TALENTS

Reliability, time-management skills and the ability to work under pressure are all desirable traits in a baker. They also need analytical and organizational capabilities. Interpersonal communication skills are necessary in order to deal effectively and politely with staff and customers. This is an ideal profession for people who want to work with their hands and express their inventiveness and creativity through their work.

WORKPLACE

Although bakers are most often employed by small retail bakeries, a significant number of them are also found working for restaurants, supermarkets, catering services and large wholesale bakeries.



GRAPHIC ARTS TECHNICIAN

Graphic arts technicians such as animation painters, copy stylists, paste up artists, sign painters, stencil makers and lettering artists produce and assemble artwork, photographs, lettering and drawings using the latest in desktop publishing software. They assist in conceptualizing a project, interpreting design specifications or sketches, and preparing production materials for press, electronic or multimedia publishing. Their handiwork is behind many of the most popular advertisements, magazines, newspapers, billboards and catalogues you see every day.

TRAITS & TALENTS

Graphic arts technicians have a keen eye for design and should be able to accommodate the needs of others, such as clients. Time management skills are essential as many graphic arts technicians work in highly deadline-driven environments. Superior knowledge of computers, animation and illustration are important assets.

WORKPLACE

Graphic arts technicians spend a considerable amount of time working with desktop publishing and printing presses. They work autonomously and also as part of teams. Graphic arts technicians can expect to work for publishing, communications, advertising, marketing, printing and multimedia firms. Others can expect to work for media companies and film production companies. Many are self-employed.

COOK

There are two main types of cooks (also known as chefs): institutional cooks who prepare a small selection of entrees, vegetables and desserts in large quantities, and restaurant cooks who prepare a wider selection of dishes in individual servings. The chef is generally the most highly-skilled, trained and experienced of the kitchen's staff.

Cooks are responsible for planning menus, ensuring food quality, deciding the size of servings, estimating material and labour costs, administering budgets and hiring staff. The head chef supervises the activities of sous chefs, specialist chefs and cooks, and instructs them in the preparation, cooking, garnishing and presentation of food.

TRAITS & TALENTS

Cooks must be highly organized in order to schedule food preparation, coordinate the work of the kitchen staff, and ensure that quality food supplies are available in the right quantities. Good interpersonal skills are essential for communicating effectively with customers and other employees. In addition, cooks should be people-oriented and team players, as they work closely with kitchen and service staff. As the presentation of a meal is almost as important as the preparation of its ingredients, many cooks have a creative and artistic flair. A keen sense of taste and smell are also necessary.

WORKPLACE

While the majority of cooks work in restaurants, they are also employed by hotels, catering businesses, tourist resorts, cruise ships and institutions. Their schedules routinely involve long and irregular hours, including evenings, weekends and holidays.

HORTICULTURIST

Often called tree surgeons, horticulturists survey and assess landscapes, and perform cultural, biological and chemical pest control. Their work adds life and beauty to our communities and neighborhoods, and improves our environment. Horticulturists are often called upon to protect trees on construction sites and appraise the value of damaged or destroyed trees. They inspect trees and shrubs to diagnose problems and diseases.

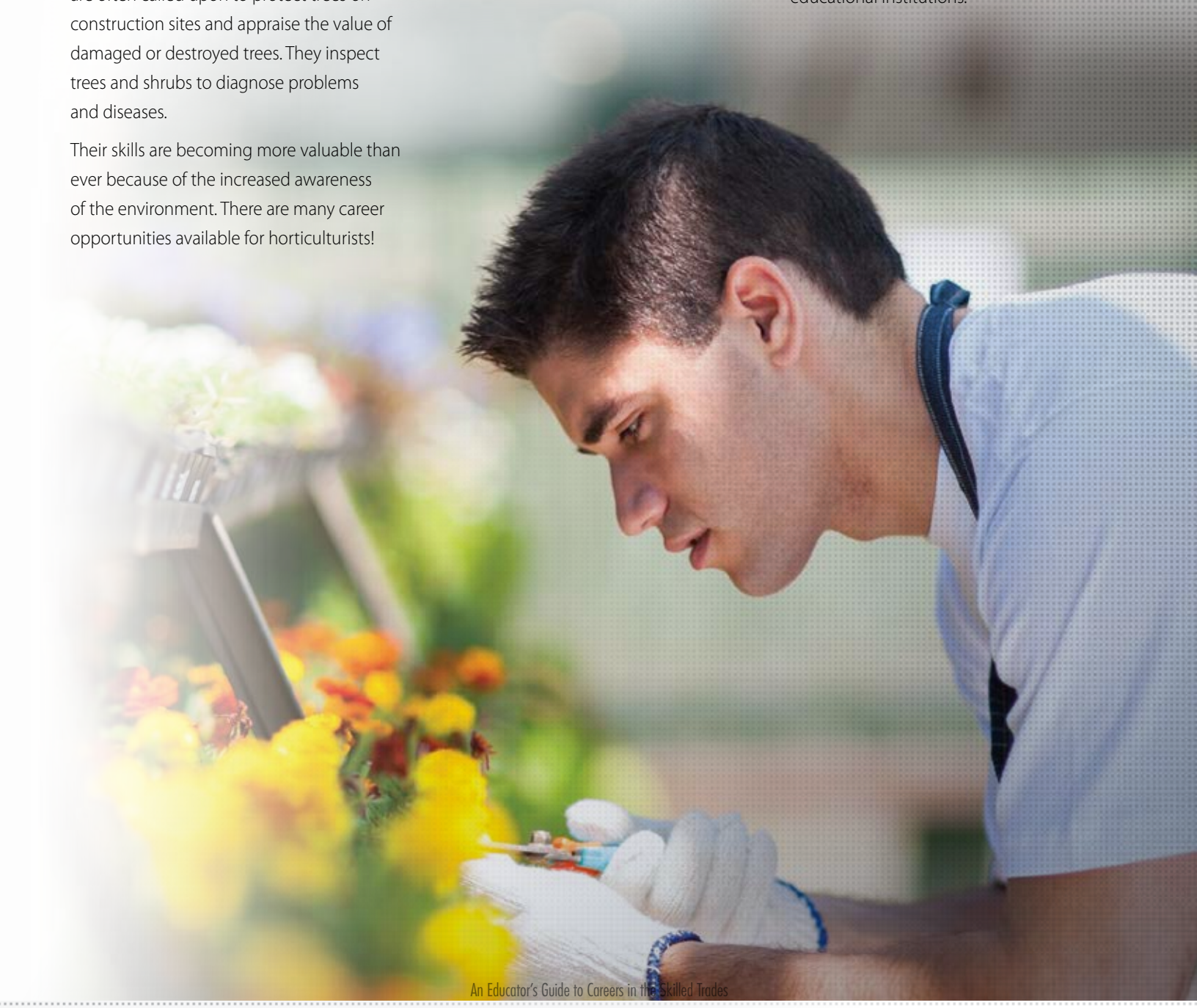
Their skills are becoming more valuable than ever because of the increased awareness of the environment. There are many career opportunities available for horticulturists!

TRAITS & TALENTS

Horticulturists generally love the outdoors and have a natural curiosity about their surroundings. They also don't mind heights and have a good sense of balance. Some of the work requires climbing trees with and without spurs. Horticulturists normally take classes in forestry, plant science, pest management and natural resources.

WORKPLACE

The work of horticulturists can be varied. Many ply their trades outdoors on golf courses or in public parks. Some work on major research projects on crop production or plant breeding for private companies or the government. Some horticulturists with advanced degrees in sciences become professors and work for educational institutions.



SKILLS to be a Successful Tradesperson

As educators, you play a key role in shaping young minds and influencing the career ambitions of your students. The following questions may help to identify students with the right aptitude and qualities for a career in skilled trades.

A CAREER IN THE TRADES REQUIRES KNOWLEDGE AND SKILL, INCLUDING:

- good literacy
- mathematical and analytical skills
- problem-solving skills
- attention to detail
- an aptitude for visualizing the end product
- creativity and imagination
- coordination and dexterity
- the ability to work with tools
- computer proficiency

DOES YOUR STUDENT POSSESS...

- a natural knack for building and repairing
- good hand-eye coordination
- a talent for tackling mechanical challenges
- an eye for detail
- physical dexterity and stamina
- an ability to solve mathematical problems
- an ability to think analytically to arrive at a solution
- a creative talent

Students that answer YES to any of these questions should seriously consider careers in skilled trades.

DOES YOUR STUDENT ENJOY...

- working with technology and computers
- working with tools to achieve a task
- being physically active
- being busy and constantly on the move
- working outside

IS YOUR STUDENT MOTIVATED BY...

- seeing his or her achievements at the end of the day
- wanting to earn while they learn, rather than taking on student debt
- making a good salary
- lifelong learning
- a rewarding career
- the ability to learn new technologies

SKILLS FOR THE TRADES

A natural knack for building and repairing?

Carpenter or Autobody repairer

Good hand-eye coordination?

Heavy equipment operator or Cabinetmaker

A talent for tackling mechanical challenges?

Truck and transport mechanic or Powerline technician

An eye for detail?

Baker or Tile setter

Physical dexterity and stamina?

Welder or Sprinkler system installer

An ability to solve mathematical problems?

Machinist or Electronic technician

An ability to think analytically to arrive at a solution?

Automotive service technician or Plumber

A creative talent?

Hairstylist or Cook

CAREER PATH

Having a skilled trade opens doors and generates long-term options for our youth. The first step to becoming a certified journeyperson is becoming an apprentice.

Further steps on this career path may include:

- becoming a supervisor or manager
- becoming a business owner
- becoming a master journeyperson
- representing a trade in a business, trade or labour group
- becoming a trade instructor

The opportunities to succeed as a tradeperson are endless. It all depends on:

- Good attitude
- Good work ethic
- Passion for the trades!

Let's take a look at the most important step on this path to success... APPRENTICESHIP.

"Many families ignore the potential of the skilled trades where people work with their hands. Yet these jobs provide a good income and the worker (man or woman) gets to choose whether to work for himself [/herself] or an employer. And we desperately will need those tradespersons as the population ages. At the moment there is a social bias against the trades, and we see lots of young people dropping out of college or university because they have not found the programs that really suit their interests. What a waste!"

Judith Maxwell, former chairperson of the Economic Council of Canada and former president of Canadian Policy Research Networks in The Globe and Mail's August 2012 online chat concerning the future of jobs.

SECTION 2

ABOUT APPRENTICESHIP

Imagine post-secondary training that puts you to work in a high-demand occupation, providing on-the-job experience while you work toward certification. Now, imagine being paid for it!

APPRENTICESHIP IS...

...a high-quality post-secondary option that gives youth the opportunity to combine on-the-job and in-school technical training, enabling them to obtain the skills required to become a certified tradesperson. Apprenticeship training provides the opportunity for "hands-on" learning with the ability to "earn while you learn."

IN THIS SECTION, WE EXPLORE:

- apprenticeship
- the benefits of apprenticeship
- how to travel with a trade
- steps to entering an apprenticeship
- key partners in apprenticeship
- frequently asked questions about apprenticeship

"A desire to learn and curiosity about how things work and go together in any of the trades is important because things change, codes change, and you have to know what's new and what's coming. This field is very exciting because you're always updating and learning something new."

Karen Macfie, Millwright apprentice in Newfoundland (CAF-FCA profile)

KEY BENEFITS of Apprenticeship

There are lots of benefits of taking an apprenticeship:

EARN WHILE YOU LEARN ON THE JOB

Apprentices are given a salary by the employers that hire them. This salary is equitable within the industry and in accordance with provincial standards. The apprentice's salary may increase each year as they progress toward certification.

KEEP STUDENT DEBT LOW

Another big benefit of apprenticeship training is that debt loads after completion of apprenticeships are much lower since apprentices "earn while they learn." On the other hand, the average university student graduates with nearly $28,000 in debt and takes an average of 14 years to pay it off based on an average starting salary of just under $40,000.[25]

A JOB GUARANTEE

Skilled workers are in demand across the country and around the world. A good work ethic, a can-do attitude and a Certificate of Qualification will almost guarantee a job upon completion. The skills gained through apprenticeship are the starting point for exciting, varied careers.

ELIGIBILITY FOR EMPLOYMENT INSURANCE DURING TECHNICAL TRAINING

Apprentices may receive Employment Insurance (EI) during technical training. That's one of the many benefits of apprenticeship training versus other forms of post-secondary education. While in a technical training institution, college or union training centre for block-release, many apprentices collect benefits that represent a percentage of their salary. Some employers will top up EI benefits or continue to pay an apprentice's salary while they're attending school.

RECEIVE PERSONAL TRAINING AND MENTORSHIP

Apprentices have an opportunity to develop their skills through personal, on-the-job training from a highly-qualified journeyperson. These mentors share their experience and pass along valuable insights about how to do their jobs.

ACQUIRE A SKILL THAT WILL LAST A LIFETIME

As a tradesperson, the skills learned will not only last a lifetime; they will also open doors to other opportunities. Journeypersons can take advanced training to continue developing their talent and work their way into challenging and rewarding careers in management or teaching. Many start their own businesses.

Did you know?

- Many provincial/territorial governments have special programs for secondary school students who are interested in apprenticeship. These programs offer early training in the trades and a chance to try working on job sites. Depending on the province/territory, students can earn credits towards their apprenticeship program while completing their secondary school diploma. The provisions of these programs vary by trade and jurisdiction, but they are great opportunities to gain exposure to the trade and see if it will be a good fit. All of these programs highlight the priority that industry and government attach to attracting youth to apprenticeship training. Your local apprenticeship office will have specific information about your jurisdiction's program.
- There were 430,452 registered apprentices in Canada in 2010, an increase of 5.2% from 2009.[26]

"Apprenticeship offers a viable post-secondary education option to university and college, and an opportunity to 'earn while you learn'."

Emmanuel Dick, Past President, Canadian Ethnocultural Council

"Apprentices are the first link to the success of Canadian businesses. They are eager and want to learn, greatly contributing to productivity and a quality product. Once they are certified, they become the mainstay of our business as skilled journeypersons. Supporting apprenticeship ensures that industry will have a strong workforce well into the future. Without qualified employees, I simply wouldn't have a business."

Don Oborowsky, President, Waiward Steel Fabricators Limited

RED SEAL - A seal of excellence.

Another benefit of completing an apprenticeship is the opportunity to obtain your Red Seal endorsement, industry's standard of excellence.

HOW DOES IT WORK?

Industry stakeholders and trade experts from across the country established the competencies and standards for 55 Red Seal trades. These trades represent more than 80% of all trade certifications in Canada. Upon completion of their programs, apprentices may write the inter-provincial Red Seal examination – the successful completion of which leads to a designation widely recognized by skilled trades employers across the country.

For more information on the Red Seal trades, visit www.red-seal.ca.

5 STEPS TO AN APPRENTICESHIP

STEP 1

FINISH HIGH SCHOOL

Complete your secondary school education. Like university or college, the entrance requirement for most trades includes Grade 12. A youth apprenticeship program is also an option while you are in high school.

STEP 2

FIND A TRADE

There are more than 300 skilled trades in Canada, but which one is right for you? Assessing your interests, skills, aptitude and the kind of lifestyle you want is never an easy process. You should talk to your career /guidance counsellor at school and your parents, as well as consult your local apprenticeship office. Take some time to consider what trades are in demand in your region.

STEP 3

FIND AN EMPLOYER TO HIRE YOU

Once you have picked a trade, you must find an employer to hire you. Approach this task like any other job search, bearing in mind that up to 80% of all job openings are never advertised. Consider asking employers to meet with you to discuss the trades they need, then expressing interest in any upcoming opportunities.

STEP 4

REGISTER

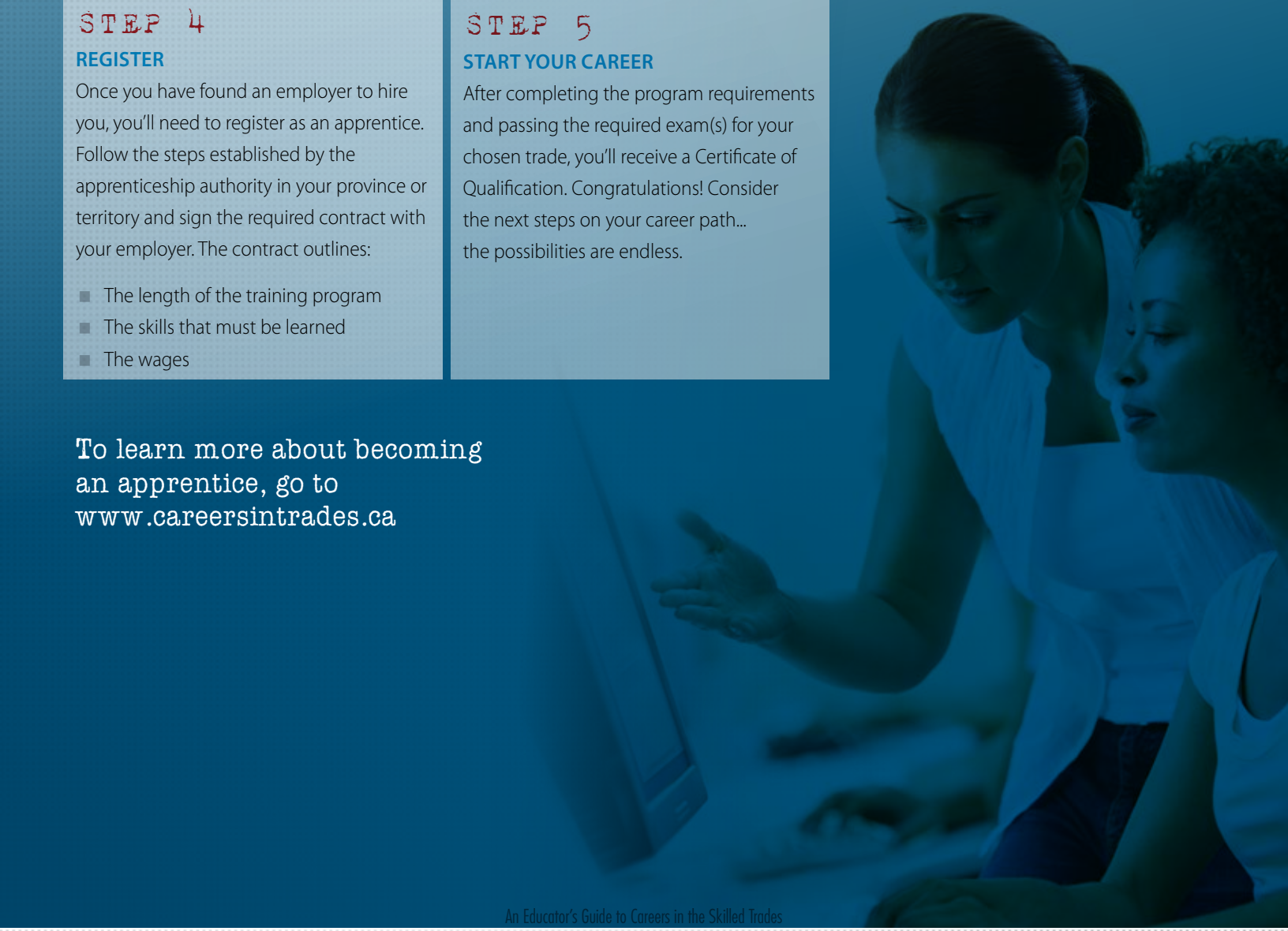
Once you have found an employer to hire you, you'll need to register as an apprentice. Follow the steps established by the apprenticeship authority in your province or territory and sign the required contract with your employer. The contract outlines:

- The length of the training program
- The skills that must be learned
- The wages

STEP 5

START YOUR CAREER

After completing the program requirements and passing the required exam(s) for your chosen trade, you'll receive a Certificate of Qualification. Congratulations! Consider the next steps on your career path... the possibilities are endless.



To learn more about becoming an apprentice, go to www.careersintrades.ca

Tips for FINDING AN EMPLOYER

NETWORK! NETWORK! NETWORK!

- Discover the "hidden" job market by going around to businesses that are in the trade you are interested in.
- Ask your career counsellors for advice. Consult your local apprenticeship authority, joint labour/management training boards and trade associations to see if they know any employers who are looking for an apprentice.
- Tell everyone you know and everyone you meet that you are looking for a job.
- Carry a résumé with you. Leave it with every employer you speak to – even if they are not hiring.
- Get the names and phone numbers of the employers or supervisors you've reached out to. Follow up with them.
- Gain experience in the trade and exposure to employers by taking a pre-apprenticeship or youth apprenticeship program.
- Search online job boards for résumé and interview tips, and to learn about the employers who are hiring.

You can also find an employer the old-fashioned way – by pounding the pavement and scanning the classifieds in newspapers or online. Some of today's most popular online job boards include:

- monster.ca
- workopolis.com
- workingincanada.gc.ca
- jobbank.gc.ca
- canadajobs.com
- apprenticesearch.com
- labourmarketservices.gov.bc.ca

FAST FACT

"For six consecutive years (2007-2012), employers from around the world have reported that skilled trades positions are among the top five most difficult jobs to fill."

Talent Shortage Surveys 2011 and 2012 by ManpowerGroup.

"Apprentices not only benefit from the 'earn while they learn' dynamic of the apprenticeship training process, they also become confident of the security and accomplishment that mastering a trade provides."

Ken Georgetti, President, Canadian Labour Congress

APPRENTICESHIP – A Partnership for Success

A successful apprenticeship relies on the full support and participation of the apprentice, the employer, the journeyperson mentor, the technical training institute and the government apprenticeship authority. Here's what each party is responsible for:

EMPLOYER

1. Provide the apprentice with on-the-job training supervised by a certified journeyperson.
2. Maintain a work environment that is conducive to learning and offers the apprentice a safe place to work with proper equipment and shop facilities.
3. Pay the apprentice's wages (usually set at a rising percentage of the journeyperson wages).
4. Arrange for the apprentice to have time for in-school technical training.
5. Keep accurate records of the on-the-job training hours and type of work accomplished– usually in an official record book or log. In some provinces/territories, the employer may also be responsible for providing a letter verifying the apprentice has completed all the necessary requirements.
6. Notify the local apprenticeship office if:

- There are changes to facilities, equipment or staffing which could affect the ability to provide on-the-job training or supervision.
- The company relocates or changes its mailing address.
- The apprentice leaves.

APPRENTICE

1. Find appropriate employment.
2. Actively participate in and successfully complete the required on-the-job and in-school training.
3. Keep track of progress, including the required hours and skills sets needed to complete the apprenticeship. In some provinces/territories, the apprentice may be given a log book that the employer or journeyperson updates. Ask them to sign off on skills learned.
4. Provide honest and loyal service, showing due regard for the property of the employer.
5. Respect all lawful orders given by the employer or any person designated by the employer.
6. Work safely, not just for personal safety but for that of co-workers.

JOURNEYPERSON MENTOR

1. Monitor the apprentice's on-the-job training.
2. Demonstrate and explain how to complete the tasks of the trade according to the provincial/territorial government guidelines.
3. Include the apprentice in a wide range of work tasks so that the full scope of the trade is covered during the on-the-job training.
4. Keep accurate records of the on-the-job training tasks completed and sign off in the apprentice's logbook, if required.
5. Update the employer on the apprentice's progress.

TECHNICAL TRAINING INSTITUTE

1. Develop and deliver curriculum based on standards established by the apprenticeship authority.
2. Explain why tasks may be completed in a certain way, whether for safety or efficiency reasons.
3. Develop and support the apprentice's theoretical knowledge of the trade by assigning and grading projects.
4. Give tests and exams to evaluate the apprentice's progress and to provide help and supports when needed.
5. Assess deficiencies and direct apprentices to supports available to them.

APPRENTICESHIP AUTHORITY

1. Work with industry to develop and maintain occupational definitions, training and certification standards.
2. Designate training institutions that are authorized to deliver the technical training portion of apprenticeship.
3. Set tuition fees and pay technical training costs not covered by these fees.
4. Keep employers and apprentices informed about the system.
5. Issue certificates, monitor and verify record books for apprentices and qualified journeypersons.
6. Develop and manage examinations for each level of the program and final qualification for certification.
7. Assist in the scheduling of technical training (in most provinces & territories).

MORE QUESTIONS? WE HAVE ANSWERS

What is a journeyperson?

A journeyperson is a certified expert in a particular trade. He or she must have provincial or inter-provincial certification in their trade. The journeyperson is responsible for mentoring and training the apprentice in the workplace according to the provincial/territorial government guidelines. Once an apprentice is certified, he/she becomes a journeyperson.

Who is responsible for apprenticeship training?

Regulating apprenticeship training is the responsibility of the provincial or territorial government. Each of the partners in apprenticeship – the employer, the apprentice, the journeyperson and the technical training institute – have specific responsibilities associated with training and certification.

Who can employ an apprentice?

Only employers who have a qualified journeyperson on staff to mentor an apprentice are able to hire apprentices, as well as those who adhere to all health and safety legislation within a jurisdiction.

Does an apprentice need to complete their training with one employer?

No. However, it is necessary that both the apprentice and the new employer notify their local apprenticeship authority about this change. All of the training documentation is required from previous employers to verify the required skills have been obtained by the apprentice.

Where does technical training take place?

The majority of apprenticeship programs involve technical training at community colleges or industry training centres. In some trades, private colleges also provide apprenticeship training. Completing some of the technical training online can be an option, too. Check with your technical training provider or your provincial/territorial apprenticeship authority.

What is certification?

Certification is a term used by most provincial and territorial governments to indicate that an individual has the necessary training requirements and has passed the certification examinations required within their trade. It shows both customers and employers that you have the skills and experience to practice your trade.

Is certification mandatory in all trades?

No, not all trades require certification. However, there are some trades that are compulsory, meaning that they must be practiced only by certified journeypersons and registered apprentices. Certification is voluntary in other trades. Check with your provincial/territorial apprenticeship authority in your region to learn more.

Why is it important to be certified?

Being a certified journeyperson is a real advantage in today's workforce. Certification is proof that a tradesperson has all the training and skills needed to perform tasks – this is important to many employers and to customers.

Is a high school diploma necessary to become an apprentice?

Most apprenticeship programs require a high school diploma. However, there may be exceptions based on the employer and the minimum requirements that are needed to enter into an apprenticeship program which is determined by the province or territory. Employers generally prefer an apprentice that has finished their secondary education, but they also consider the attitude, aptitude and current skills of the youth to perform job requirements.

Are there any opportunities for apprenticeship in high school?

Many provincial/territorial governments have introduced special programs for secondary school students who are interested in apprenticeship. These programs offer early training in the trades and opportunities to combine school and work.

How long does it take to complete an apprenticeship program and become a certified tradesperson?

The length of the training varies depending on the trade, but generally takes between 2 and 5 years. Most of the training is provided in the workplace. Normally, an apprentice works for 40 to 44 weeks a year and goes to school for a six-to-eight week "block" of training.

How much does it cost to complete an apprenticeship?

Apprenticeships cost less than other post-secondary options. Tuition costs vary depending on the trade and the province/territory. There may be additional costs for books, equipment, tools and living expenses. However, apprentices are paid during their on-the-job training. There are also a number of grants and tax credits available to reduce the cost of apprenticeship training. Consult your local apprenticeship office to learn more about both federal and provincial/territorial supports.

Does an apprentice receive an income while attending technical training?

If apprentices have been employed for long enough to qualify, most are eligible for Employment Insurance (EI) while they are completing technical training. Some employers pay their apprentices while they're in school, or "top up" EI benefits so apprentices continue to receive the equivalent of their wages while they're in school. Apprentices serve only one two-week waiting period per apprenticeship and are not generally required to wait in subsequent training periods. It is important to understand the regulations surrounding EI eligibility, so be sure to contact Service Canada (www.servicecanada.gc.ca) or your local apprenticeship office for more information.

"Real world work experiences provide youth with an opportunity to develop an understanding of the workplace and work skills. A varied exposure to all facets of the trade shapes future values and goals. The apprenticeship is a foundation that allows youth to achieve their desired goals. It contributes to the successful transition from school to real world employment."

Mike Hanson, Construction electrician journeyperson in New Brunswick, at CAF-FCA National Forum Dialogue in October 2010

SECTION 3

ACTIVITIES TO EXPLORE SKILLED TRADES AND APPRENTICESHIP

There are many interesting ways to explore skilled trades and apprenticeship with your students. This section includes a number of classroom activities to get your students thinking about the skills and knowledge required to perform a trade. You will also find a number of "Quick Tips" to get you started.

IN THIS SECTION, WE EXPLORE:

- ideas for bringing skilled trades into your classroom.
- classroom experiments to demonstrate the complexity of tasks that skilled tradespeople perform every day.

"Youth today don't get a chance to experience the trades at home. They aren't exposed to skilled trades in the same way as we once were, and deserve an opportunity to learn about their strengths and career preferences."

Éric Lessard, President and owner of Petro-Canada Certigard in Sainte-Foy, Quebec (CAF-FCA employer profile)

QUICK TIPS

Invite a skilled tradesperson to your classroom to talk about their occupation. Tradespeople can be found through:

- local businesses
- trade associations
- labour groups
- community colleges

- Contact the Canadian Apprenticeship Forum or the Skills/Compétences Canada office nearest you (see contact list in Section 4). Their staff would be happy to help you organize a classroom presentation about skilled trades for your students.
- Organize a field trip for your students to a skills competition in your region. These exciting Olympic-style skills competitions showcase students' technical and leadership skills. Students participate in practical challenges designed to test skills required in technology and trade occupations. For more information, contact the Skills/Compétences Canada office nearest you.
- Assign a research project on a skilled trade. Start by dividing your class into groups. Have each group select a trade they are most interested in. Have them write down their initial perceptions and knowledge of their chosen trade. Then have each group research their trade to identify:
  - the duties involved
  - the education and skills needed to perform the trade
  - the wage and the number of hours generally worked
  - the work environment

Finally, have each group make a presentation on their trade to the class. Make sure they talk about their initial perceptions and how they are different from the reality of the trade.

FAST FACT

"There will be 6.5 million job openings between 2011 and 2020 due to economic growth and replacement needs. Nearly 70% of the jobs created by economic growth are expected to be in occupations generally requiring postsecondary education (college, apprenticeship/vocational or university) or in management."

Imbalances between labour demand and supply, 2011-2020. Canadian Occupational Projection System, Human Resources and Skills Development Canada.

"The top professions in demand in Canada include the skilled trades, engineering and specialist information technology."

Conference Board of Canada. "Compensation Planning Outlook 2013." Released in 2012.

ACTIVITIES FOR THE CLASSROOM

Test Your Students' Skilled Trades IQ

Discover how much your students really know about skilled trades, and allow them to find out for themselves whether they're an apprentice, a journeyperson or master journeyperson! This fun and interactive quiz can be used to spark a dynamic discussion about skilled trades. The answer guide is on page 39. Good luck and have fun!

TEST YOUR SKILLED TRADES IQ

Skills Shortage

1. By what year will Canada have a shortage of 1 million skilled workers?

A. 2030
B. 2025
C. 2015
D. 2020

2. By what year will the majority of Canada's population be over the age of 65, and thus less likely to be working?

A. 2028
B. 2016
C. 2036
D. 2040

Skilled Trades

3. Approximately how many skilled trades occupations are available in Canada?

A. 150
B. 300
C. 50
D. 100

4. What percentage of apprentices who completed their apprenticeships earned between $25-$50/hour in 2005?

A. 23%
B. 85%
C. 11%
D. 56%

5. Skilled trades fall under four main sectors of the economy. What are they?

A. Motive power/transportation, manufacturing/industrial, business administration, health sciences
B. Construction and maintenance, motive power/transportation, earth sciences, service
C. Service, manufacturing/industrial, construction and maintenance, motive power/transportation
D. Business administration, construction and maintenance, service, motive power/transportation

Apprenticeship and Education

6. What percentage of Canada's workforce will need to have post-secondary credentials (apprenticeship, university, college, polytechnic, professional or industry-sponsored) by 2031?

A. 77%
B. 65%
C. 40%
D. 90%

7. What is the average debt of a university student at the end of his or her studies?

A. $10,000
B. $5,000
C. $35,000
D. $28,000

8. What is the percentage of students that graduate from university?

A. 25%
B. 50%
C. 70%
D. 10%

9. As a first-year construction boilermaker apprentice, you may start out earning what percentage of a journeyperson's wage?

A. 60%

B. 35%

C. 80%

D. 45%

10. What is the average ratio of technical training to on-the-job training for an apprentice during the full length of his or her apprenticeship?

A. 60% technical training : 40% on-the-job training

B. 20% technical training : 80% on-the-job training

C. 15% technical training : 85% on-the-job training

D. 40% technical training : 60% on-the-job training

11. What does an apprentice receive after successfully completing his or her apprenticeship?

A. a permit

B. a certificate of qualification

C. a record of achievement

D. a diploma

12. What are some of the steps involved to completing an apprenticeship?

A. Finish high school and find a trade that suits you

B. Find an employer

C. Register as an apprentice

D. All of the above

13. Approximately how many apprentices were registered in Canada in 2010?

A. 430,500

B. 100,700

C. 365,800

D. 90,200

ARE YOU...

Just getting started (0-7/13)

This is the perfect opportunity to learn as much as you can. If you're thinking about careers and are not sure where to start, or where your interests lie, be sure to check out www.workingincanada.gc.ca.

An Apprentice (7-10/13)

Congratulations! You're ready to start your journey as a skilled tradesperson. With a little bit of work you too can gain a "Certificate of Qualification!" For more information about skilled trades in your area, go to www.careersintrades.ca.

A Journeyperson (11-12/13)

That's the ticket! You've got the knowledge; now you just need the experience. Apprenticeship can even start in high school. Your guidance counsellor can help you discover the skilled trades. Go to www.careersintrades.ca to find out even more cool facts about skilled trades.

A Master Journeyperson (13/13)

Wow! You've definitely demonstrated the aptitude and knowledge of a master journeyperson – a definite challenge. Visit www.red-seal.ca to find out how you can earn while you learn and travel across the country!

TEST YOUR SKILLED TRADES IQ: ANSWER GUIDE

Skills Shortage

1. D: 2020 (Conference Board of Canada)
2. C: 2036 (Rick Miner's "Jobs of the Future: Options and Opportunities")

Skilled Trades

3. B: 300 (Canadian Apprenticeship Forum)
4. D: 56% (Statistics Canada. National Apprenticeship Survey, 2007)
5. C: service, manufacturing, construction, motive power

Apprenticeship and Education

6. A: 77% (Using a variety of Canadian and U.S. estimates and projections. "Jobs of the Future: Options and Opportunities")
7. D: $28,000 (www.ratesupermarket.ca)
8. A: 25% (Conference Board of Canada)
9. A: 60% (International Brotherhood of Boilermakers http://www.boilermaker.ca/pay.htm)
10. B: 20% : 80%
11. B: A certificate of qualification
12. D: All of the above
13. D: 430,500 (Statistics Canada)

"Individuals who pursued vocational training, such as apprenticeships, were happier than university graduates upon completion, according to an Australian study."

Education and Happiness in the School-to-Work Transition.
National Centre for Vocational Education Research, 2010.

"Ninety-seven percent of parents, ninety-nine percent of teachers, and eighty-three percent of students agreed that there are good job opportunities in the skilled trades."

Labour and Workforce Development, Government of Nova Scotia. Youth Decision Survey Report. July 2010.

CLASSROOM ACTIVITY 1

WE ALL SCREAM FOR ICE CREAM

Trade Link: Cook/Chef

(A tasty activity on chemical reactions and heat transfer)

TEACHER BACKGROUND

- **Duration:** one (1) 45-minute class
- **Group Size:** small groups of 4 students (or smaller if you have sufficient supplies)
- **Setting:** indoors (classroom)

MATERIALS

- Soup can, coffee can or small metal container
- A test tube or baby food jar
- 10ml of salt
- Crushed ice
- Celsius thermometer
- 15 ml homo milk (or half and half cream)
- Pinch of sugar
- Vanilla
- Swizzle stick, popsicle stick or thin stick (for stirring), about 15cm long

RATIONALE

At this level, students explore properties of fluids and use the particle theory to explain their observations. They also learn about chemical reactions and try to relate them to their own experiences. Cooks take advantage of this knowledge in their preparation of foods. Kitchen chemistry can involve a range of scientific principles.

METHOD

In this activity, you will cool down milk, sugar and vanilla by putting the solution in a test tube and placing it in a container filled with an ice and salt mixture. It will cool down enough to freeze. In essence, the salt and ice takes heat away from the milk solution.

GETTING STARTED

Chemical reactions have become a part of our everyday life. They are all around us. You may have learned how we can affect the properties of some objects by adding new substances to them. In some places, in the wintertime, people add salt to roads to lower the freezing point of water. This helps to keep roads free of snow and ice. In this activity, you will take advantage of this scientific principle and get a "tasty" result.

*The activities on pages 40-51 are based on a resource called, "Making Connections: Linking Science and Math with Trades and Occupations," developed by the NWT Apprenticeship and Occupational Certification.

THE ACTIVITY

1. Put crushed ice in the metal container so that it is about 1/2 full.
2. Add 10 ml of salt to the ice and stir until the temperature is between -8 degrees Celsius and -10 degrees Celsius.
3. If the temperature is not low enough, add more salt and keep stirring.
4. Put 15 ml of milk (or half and half), a pinch of sugar and one drop of vanilla into a CLEAN test tube (or baby food jar).
5. Place the test tube in the metal container and pack the ice around it.
6. Stir your mixture for the next 15 to 20 minutes until your ice cream is ready to eat.
7. Describe all the reactions (physical and chemical) which took place during this experiment.

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Challenge students to lift an ice cube floating in water out of a container without touching it. All they are allowed to use is a string and some salt. (Solution: salt lowers the freezing point of water, so when you put salt on the string and touch it to the ice, the ice cube under the string melts a little. As the ice melts, the air around it cools and causes the ice cube to refreeze and the string becomes frozen to the ice cube.)
2. Invite a cook to come into the classroom and talk about chemical reactions and food chemistry.

INFORMATION BITE

During your training as a cook, you will not only learn about kitchen safety and basic cooking principles, you will also learn advanced preparation techniques for both small and large situations. A strong background in classification systems will assist you in learning about various types of foods such as sauces, stocks, soups, salads, fish, dairy products and cheeses, baked goods and desserts. Cooks are employed in hotels, restaurants, catering firms, cafeterias, institutions and isolated camps. Kitchen mathematics includes ratios, recipe conversions, fractions, decimals, and working with invoices and orders.

CLASSROOM ACTIVITY 2

GOING UP?

Trade link: Inspector (Electrical)
(An activity on hydraulics)

TEACHER BACKGROUND

- **Duration:** one (1) 45-minute class
- **Group Size:** small groups of 2-3 students
- **Setting:** indoors (classroom)

MATERIALS

- Two identical syringes (approximate 60ml size)
- One syringe (10ml)
- Beaker or glass of water
- Plastic tubing approximately 100cm in length (airline tubing for aquarium filters works well)
- Clamps and retort stands to hold syringes (optional)
- Heavy object or weights (kg)

RATIONALE

Students, when studying fluids and hydraulics, learn that fluids have special properties such as viscosity, density, buoyancy and compressibility which are useful in industry and in our daily lives. Most people think of liquids when they hear the word "fluids", but gases are also fluids. These concepts, combined with a basic understanding of Pascal's law, have led to numerous inventions such as hydraulic and pneumatic systems which are used every day by heavy duty equipment operators and mechanics. Systems that use fluids to transfer forces are called hydraulic systems.

METHOD

This activity should be done over a sink. Students create a hydraulic press using two identical syringes connected by plastic tubing. The experiment can be repeated using one large and one small syringe. In both scenarios, the moving part of the syringe represents a movable piston. Students can use their sense of touch to compare the amount of force required in both cases to move an identical object resting on the larger sized syringe.

GETTING STARTED

The study of fluids and their various properties such as buoyancy, density, viscosity and compressibility has led to inventions which have helped us to do work or make our lives easier. These systems are called hydraulic systems. In this activity, you will design a hydraulic press.

THE ACTIVITY

1. Connect two identical large syringes (plungers removed) with plastic tubing (100cm in length).
2. Add water to one until both syringes are full.
3. Keeping the two syringes level, place a plunger into one syringe, pushing it all the way in.
4. Place the second plunger into the open syringe, pushing gently until both plungers are halfway down. You now have a closed system with no air in it.
5. The syringes should be level and held carefully or supported on retort stands with clamps. Place a small weighted object on top of one of the syringe plungers and push against the other plunger to make it rise. You will need to compare the force used to raise the object in this activity with the force needed in the activity identified in the next step.
6. Repeat this experiment using one syringe from the previous activity and a second smaller syringe. Compare the force needed to move the same weighted objects (placed on the larger plunger) as in the first activity. Which activity required the least amount of force?

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Repeat experiment using a 10ml and a 100ml syringe (if available). Were the results what you expected?
2. Design an experiment to show if the type of liquids used affects the results.
3. Test to see if the experiment will work using "air" as your liquid.
4. Design posters on elevator safety or handicap lifts to promote safety among younger students at your school.
5. Find out how often lift devices in your school are inspected and by whom.

INFORMATION BITE

To be an electrical and/or elevator inspector requires a journeyperson ticket as an electrician and/or elevator constructor. Elevator constructors train to install, modify, service and repair electrical and hydraulic elevators, hoists, moving walkways and escalators. Electricians learn about electrical systems, controls and switches, heating and cooling systems, electronics and lighting. To be successful in either trade, you will need mechanical aptitude, the ability to do detailed and precise work, the ability to read blueprints, and a willingness to continually upgrade your knowledge and skill levels regarding new innovations in the industry. Inspectors generally have extensive experience in the trades area and work for government and/or regulatory agencies.

CLASSROOM ACTIVITY 3

KEEP YOUR COOL

Trade Link: Refrigeration and Air Conditioning Mechanic
(An activity on minimizing heat energy transfer)

TEACHER BACKGROUND

- **Duration:** two 45-minute classes (includes taking temperature readings during the day)
- **Group Size:** small groups of 4 students
- **Setting:** indoors (classroom)

MATERIALS

- Container of ice water (plastic bottle, cup with lid, graduated cylinder, etc.)
- Tape (duct tape or masking tape)
- Materials for container could include cardboard, rigid insulation, plastic wrap, tinfoil

RATIONALE

Heat is a form of energy very important to our lives and to our community. Students should have an opportunity to explore properties of heat through discovery. Students at this level learn about the kinetic molecular theory and the particle theory. They can explain heat loss or transfer using these theories.

METHOD

In this activity, students will be asked to design a device to minimize heat loss. Using materials provided by the teacher, students will create a device to hold a container of ice cold water. Although the teacher provides generic materials for this activity, students should be encouraged to be creative and to identify other readily available materials for use in their designs. The students will take the temperature of the ice cold water at the beginning of the activity and after each half hour until the end of the day or until the water's temperature is at room temperature. The data can be displayed in a graph that charts time versus temperature.

GETTING STARTED

Heat is a form of energy that people living in cold climates are very familiar with. In this activity, you will explore heat loss. The goal is to design a container that allows a cold liquid to stay cold for the longest possible time.

THE ACTIVITY

Day One:

1. In your group, brainstorm ideas on what your design might look like and what materials you would like to use.
2. Once you have a design in mind, make a sketch of it on a piece of paper and list all the materials you will be using on the same sheet of paper.
3. Before you build your prototype, have your teacher initial it to indicate that your design has been approved for construction.
4. Choose someone from your group to measure out 100ml of the ice cold liquid once you have built your prototype.
5. Place the container of ice cold liquid in your newly created design after you take a temperature reading of the ice water.
6. Take a temperature reading every half hour for the rest of the day or until you have to go home.

Day Two:

7. Plot a graph of temperature versus time to show your data, using your group's temperature readings.
8. Once everyone in the class has had a chance to record their data, determine which designs were the most effective.

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Try using different materials or improving on your design by combining the best ideas generated in various students designs.
2. Create different containers to hold the ice water and repeat the experiment using your original device.
3. Organize data in a spreadsheet (use of computer application optional).

INFORMATION BITE

As a refrigeration and air conditioning mechanic apprentice, you would learn about the science related to changes of state, heat and temperature, properties of coolants, compression, heating systems, electricity, equipment controls, gas laws and small engines. Training involves ordering, assembling, installing, calibrating and testing of industrial and commercial equipment. You would work for companies that install and service air conditioning and refrigeration systems.

CLASSROOM ACTIVITY 4

ONLY YOUR HAIRSTYLIST KNOWS FOR SURE

Trade Link: Hairstylist
(Chemical reactions involving the bleaching and/or streaking of hair)

TEACHER BACKGROUND

- **Duration:** two (2) 45-minute classes
- **Group Size:** small groups of 4 students
- **Setting:** indoors (classroom)

MATERIALS

- Bleach kit or streak kit for hair (available commercially)
- Hair (ask hairstylist for a small bag of clean dark brown hair or have someone in class volunteer hair)
- Beaker or glass jar
- Scotch tape
- Pencil or stick
- Stopwatch or watch with timer

RATIONALE

Modern chemistry is founded on the science related to atomic theory. Chemical reactions have become so commonplace in our daily lives that we take them for granted. Using examples that are part of a student's normal experience, such as hair colouring, can help create strong connections between theory and understanding. In this activity, students will explore the dyeing or bleaching of hair -a common trend among today's youth.

METHOD

Using clean hair (collected from hair stylist/barber shop, student volunteer or animal hair), students will experiment with the bleaching process and monitor colour change over time. When dyeing hair, you will notice a gradual change over time. Students can leave the last piece of treated hair to sit overnight and check on it the next morning. This activity works best if you start with brown hair and use a commercial bleaching or streaking kit.

GETTING STARTED

As you study atoms and elements, you will learn more about what happens when a chemical reaction takes place. In this activity, you will bleach or streak hair and observe the chemical reactions that take place over time.

Note: Black hair requires additional treatment to successfully bleach it.

THE ACTIVITY

1. In this activity, you will use six small samples of human or animal hair about 5-10 cm long.
2. Put tape around one end of each sample of hair. Put one of them on the side to use as a starting reference point. Tape remaining samples to a pencil (or other object) so that they are lined up in a row and hang down.
3. Treat each sample of hair according to the instructions included with the kit. Make note of the time.
4. At fifteen minute intervals, remove one sample of hair, rinse it with water and tape it to a piece of paper once it has dried.
5. Leave the last sample of treated hair to sit overnight and remove it the next morning.
6. You should have six samples of hair hanging on your sheet in the order in which they were removed from the chemicals. Beside each bundle of hair, write the number of elapsed minutes before it was removed.
7. What observation can you make?

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Repeat the experiment with different coloured hair and try to predict the various colour changes ahead of time.
2. Repeat the experiment using natural dyes such as lichens and berries.
3. Is there a relationship between hair colour, thickness and dyeing time?
4. Invite a hairstylist to come in and do a demonstration of streaking techniques.

INFORMATION BITE

During your training as an apprentice hairstylist, you will learn the science related to the dyeing and bleaching of hair. Other tasks in the hairstylist trade include hair and scalp treatment, chemical preparations, hair cutting and salon management. You will also learn about servicing wigs, eyebrow/eyelash treatment and manicuring. Most hairstylists work in salons, but many are self-employed, working part-time or in a sales-related position.

CLASSROOM ACTIVITY 5

FEELING BOXED IN?

Trade Link: Carpenter

(An activity on geometry turning 2-D design to 3-D models)

TEACHER BACKGROUND

- **Duration:** one (1) 45-minute class
- **Group Size:** individual
- **Setting:** indoors (classroom)

MATERIALS

- Various cardboard containers – herbal tea boxes, toothpaste box, spaghetti noodle box, Kraft Dinner box, file folder box, cereal box, milk carton, etc
- Ruler
- Graph paper

RATIONALE

This activity reinforces in the student's mind the prevalence of geometry in our everyday world. A simple design for a small cabin can be created when a 2-D design is translated into a 3-D model. The economics of packaging and design start on the 2-D plane and evolve to the 3-D product after much deliberation and study. One of the skills of carpentry is to be able to think freely between 2-D plans and 3-D products.

METHOD

In this activity, students do some backward design in terms of unravelling a pre-made package so that it looks like a 2-D polygon. The notion of not wasting any materials is important to the design and production processes. Students also do some forward thinking design by creating a 2-D polygon design that, when folded together, becomes their new 3-D "product". Students are asked to create a 2-D floor plan of a small cabin or house which, when folded together, becomes the end product.

GETTING STARTED

In this activity, you will move back and forth between two-dimensional plans and three-dimensional models. Many people who work from plans or blueprints have the ability to do this with relative ease. You can too, with a little practice.

THE ACTIVITY

1. Take one of the cardboard boxes provided and try "backward design" – carefully unwrap or unfold it until it is a flat two-dimensional object sitting in front of you. Keep in mind that when this package was designed, it started out as an idea on paper like this 2-D object, long before it was ever put together.
2. Fold your package from step 1 back together and try to imagine it being unfolded in your mind as you sketch it on a piece of graph paper. Unfold it and compare it to your sketch.
3. Imagine that you are going to build a design for a small cabin or house out of cardboard. Sketch on graph paper what it would look like. Remember, the idea is to design it in such a way that it can be cut out as one piece and folded (just like a model of a polygon) into the final product. Cut out your design, fold it together and see how it looks. Be sure to put in some flaps for gluing and taping.

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Transfer your design to balsa wood, Styrofoam or Bristol board and construct your model.
2. Try adding little extras to your original design such as a front porch, stairs, maybe even a garage.
3. Try working with a CAD (computer assisted drawing) program to develop your design.
4. Put your model house on a landscaped lot.

INFORMATION BITE

Working with drawings and blueprints is a daily activity for a carpenter. This trade involves knowledge about the many materials used in construction, hand and power tools, and the science of building construction (footings, formwork, walls, roofs, floors, room finishes, etc.). An apprentice carpenter learns to construct, erect and repair structures and fixtures made of wood. Most carpenters are employed by construction contractors, are self-employed or perform construction or maintenance work for government agencies or manufacturing firms.

CLASSROOM ACTIVITY 6

TECHNO-QUILT

Trade Link: Printing and Graphic Arts
(A visual arts activity using iron-on transfers)

TEACHER BACKGROUND

- **Duration:** one (1) 45-minute class
- **Group Size:** pairs or small groups of 3 students
- **Setting:** indoors – classroom with computers or computer lab

MATERIALS

- Iron-on T-shirt Transfer Kit(s) i.e. HP Iron-On T-shirt Transfers, Invent It Iron-On Transfers
- Sheet (cotton)
- Hand iron and ironing surface – formica counter, not ironing board or metal
- Computer and graphics software (i.e. Adobe Photoshop) with the ability to flip horizontal or mirror the image, and a compatible printer

RATIONALE

Images designed to convey specific messages are all around us. Billboards, advertisements and magazines geared to students use strong visual images to get their point of view across. In this activity, students design visual images which, when printed on a large white bed sheet via iron-on transfers, become a striking quilt (banner) used to convey a message to the rest of the school.

METHOD

You will need a commercial Iron-On T-shirt Transfer Kit in order to do this activity. Each package normally contains ten iron-on transfers. Students will need to follow the instructions that come with the kit closely. Kits are very clear as to which type of platform (IBM/MAC), software program (must be able to reverse images), sheet (cotton), and printer types can be used. Examples of a theme for visual presentation selected by the class include education week, science fairs or spirit week. In order to make the end result look like a quilt, specific frames or border types could be used in each student generated transfer. This will give the impression of each sheet being closely linked to others.

THE ACTIVITY:

1. Your teacher will provide direction as you decide on a topic or theme to present. As a class, brainstorm possible images or symbols that might be created.
2. The iron-on transfer kit(s) you will be using comes complete with instructions as to which type of computer platform (PC/ MAC), software program (must be able to reverse images), and type of sheet (cotton), and printer types can be used. Read the instructions carefully.
3. Once your transfer has been generated on the computer, run a test print before using the actual transfer on your printer. Make sure your image is reversed and the printer is compatible with the transfers (check instructions).
4. Hand iron the transfers onto a white sheet to make it look like a quilt. (Hint: each image should have a recognizable frame or border pattern to give it a quilt-like look when put together.)

BRANCHING OUT (EXTENSIONS AND VARIATIONS):

1. Design a visual graphic for a Halloween loot bag and transfer your iron-on to a pillowcase. Use it as a door prize at a school assembly.
2. Design T-shirts for a special event, a school assembly or for student council elections.

INFORMATION BITE

The technology used by printing and graphic arts tradespeople has changed significantly over the past ten years, moving more and more to desktop publishing systems. Printing and graphic tradespeople generally work for printing and publishing companies, and large corporations with in-plant printers. The length of apprenticeship is usually four years with related in-school training each year. To be successful in this trade, one needs good literacy and numerical skills, computer literacy, accurate colour perception, the ability to pay careful attention to detail, and the ability to work under the pressure of deadlines.

SECTION 4

ENDNOTES

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11. Ibid, p.44.
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23. Petroleum Industry Human Resources Committee – Newfoundland and Labrador. Career Profiles: Onshore/Offshore Welder.

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