Transportation Trades 11

Guide

NOVA SCOTIA
NOUVELLE-ÉCOSSE

2016

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Transportation Trades 11

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

Transportation Trades 11

Draft, 2016

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Transportation Trades 11, Draft, 2016

Prepared by the Department of Education and Early Childhood Development

Please note that all attempts have been made to identify and acknowledge information from external sources. In the event that a source was overlooked, please contact Education Innovation, Programs and Services, Nova Scotia Department of Education and Early Childhood Development, eips@novascotia.ca.

Acknowledgements

Skilled Trades courses are designed to give students the most realistic and current picture of what a career in the trades would be like. They are designed to be both true to the trades and pedagogically sound.

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The Red Seal endorsement is administered by the Canadian Council of Directors of Apprenticeship. It signifies a standard of professional competency that is recognized by peers within the trade, employers, and the public. The Red Seal provides a certified uniform standard of performance that allows tradespeople greater mobility throughout Canada.

Students who successfully complete Transportation Trades 11 under the supervision of a certified journeyperson teacher are eligible for apprenticeship hours for actual time in class upon registration as an apprentice or youth apprentice.

Transportation Trades 11, as is the case with all Skilled Trades courses, is designed to be taught by a certified journeyperson in a skilled trade. These people have acquired key competencies and core knowledge required to adequately portray the trades and the knowledge, skills, and attitudes necessary to be successful as a tradesperson.

The Transportation Trades 11 curriculum is not prescriptive. It is a tool for the students to achieve the outcomes and provides the teacher a framework on which to 'hang' his or her actual trades experiences. Both the curriculum and the journeyperson's experiences form the teaching plan.

The motto for all of the skilled trades courses offered in Nova Scotia high school is "Hands on-Head's in". "Hands on-Head's in" describes the unique combination of physical and intellectual demands that skilled trades work requires, and evokes the poetry and the craftsmanship that are at its core. For many talented people, "Hands on-Heads in" work is the only kind of work that they have an affinity for; that they can be happy doing. For them "Hands on-Heads in" is a vocational calling that a career in the trades can satisfy.

Before skilled trades course were introduced to Nova Scotia high schools, successful students had no way of experiencing "Hands on-Head's in" work as part of their academic program. Because of this, a four-year degree was the only path most capable students were aware of upon graduating from high school. Few of them knew anything about, or ever got a chance to directly experience and to determine, whether a life in the skilled trades might be their true vocational calling.

What this led to were several generations of students never becoming aware and pursuing careers in the skilled trades even though this is where there passion and interest for "Hands on-Head's in" work might have found its greatest fulfillment. Over the years, negative perceptions and myths about the skilled trades further ensured that very few students ever came to know about the well paid, rewarding careers that were available.

By making skilled trades an area of learning in Nova Scotia's Public School Program, students can now experience the joys of "Hands on-Heads in" work and become aware of a career path that better matches their interests and desires. Students also can directly experience the high levels of professionalism and integrity that are demanded of certified journeypersons. They quickly discover that "Hands on-Heads in" work requires care, precision, and a wide range of essential skills such as reading, document use, writing and numeracy. Myths about low pay, poor working conditions, and uninteresting work are shattered and walls that hid the possibility of a career in the skilled trades from students are finally torn down.

Background to Transportation Trades 11

Every day thousands of Canadians take their cars to be serviced or repaired at car dealerships and service centres, yet most people know very little about how their engine, brakes, and other essential automotive systems work. While we are regularly inundated with car ads on television and in newspapers and magazines, very little is known or ever revealed about what automotive service technicians, or mechanics as they are more commonly known, do to repair and service automobiles. In many ways, despite being at the heart of one of our biggest industries, automotive service and repair is almost a cloistered world.

Transportation Trades 11 provides students who successfully completed Skilled Trades 10 with an opportunity to experience first-hand the daily realities of automotive service and repair, to learn how engines, brakes, and other essential automotive systems work, and to explore career opportunities in the transportation sector. To ensure that students receive as realistic an introduction to the transportation trades as possible, Skilled Trades Centres across the province have been equipped with a comprehensive set of resources. These resources include:

Compact Car

Working with a compact car students directly explore and learn about some of the essential systems and components it contains. Students perform basic diagnostic tests and routine maintenance tasks such as servicing brakes, changing the oil and filter, and checking fluid levels. They also complete a series of projects that involve removing, re-installing and aligning or adjusting some of the car's panels, components, glass & hardware, lights, and upholstery.

Recycled Car and Recycled Automotive Components and Parts

Students also are provided with opportunities to work on a recycled car or what might commonly be referred to as a junker. Unlike the newer compact car, which was delivered direct from the manufacturer and has experienced no wear and tear or damage, the recycled car will have been driven hard and have its fair share of dents, and parts and components that are damaged, degraded, or excessively worn. Because of this, the recycled car provides an excellent opportunity for students to compare the worn and torn parts from the junker with the new and unused parts from the compact car. It also provides unique opportunities for students to perform some basic bodywork (teachers can add dents to the recycled car's exterior if none exist) and to carry out some repair and service activities such as replacing the suspension or other parts and components that cannot be performed with the new car.

Besides the recycled car, teachers and students can bring in recycled parts and components on an as needed basis to show students what worn tires, brake pads, windshield wipers, and other parts and components that require servicing actually look like.

Engine assemblies

New engine assemblies that are similar to the compact car's provide students with an opportunity to learn the basic operating principles of 4-stroke, internal combustion engines. Students complete a range of projects exploring the engine's top end, bottom end, and block. Key engine components that students can identify and describe by the end of Transportation Trades 11 include:

- Valve train (Intake, exhaust, timing)
- Cam shaft
- Combustion chamber
- Head gasket
- Piston rings
- Crankshaft
- Bearings
- Connecting rod bearings
- Oil pump & filter
- Engine block
- Cylinders
- Cylinder heads
- Oil pan

Trailer

A basic trailer, or trailer assembly, provides students with additional projects that include:

- Installing lights and wiring
- Attaching to the Skilled Trades Centre's car with a trailer hitch
- Cleaning and re-packing the trailer's wheel bearings
- Manufacturing fenders

Specialized Tools

Working with cars and engine assemblies requires special tools. Students in every Skilled Trades Centre are supplied with mechanics tool sets and a range of other tools and equipment that includes torque wrenches, flare kits, tire gauges, creepers, engine stands, and Vernier calipers.

To successfully complete the numerous automotive projects and activities that Transportation Trades 11's 110 hours of instruction demand, students must draw extensively from the skills, knowledge, and experience gained in Skilled Trades 10 which include:

- Working safely
- Collaborating with other students on project teams
- Measuring and making precise calculations
- Reading and using plans, drawings, and other documents to complete projects
- Staying organized and completing projects with tight deadlines

Along with enriching the knowledge and understanding that students have about automotive systems and engine fundamentals, Transportation Trades 11 provides a wealth of opportunities for students to learn essential workplace skills. Reading text, document use, writing, numeracy, oral communication, and continuous learning, which Human Resources and Skills Development Canada (HRDSC) defines as essential for work in the transportation trades, are consistently emphasized.

By the end of Transportation Trades 11, students have been completely immersed in many of the realities of working with engines, and of servicing and repairing automobiles. They have gained real experience and began developing some of the fundamental skills that journeypersons within the transportation sector need to succeed.

Students who successfully complete Transportation Trades 11 can continue their path towards a career in the trades by enrolling in Skilled Trades 12 Co-op. Skilled Trades 12 Co-op is a

community-based learning course that offers students on-the-job training opportunities, which could include working at local automotive dealerships, repair garages, and service stations.

Students completing Transportation Trades 11 are also well prepared for summer jobs at local garages and service stations, and to continue studying a trade at college, or to register as apprentices, after graduating from high school. They have hands-on experience with some of the key components and systems that cars contain, a basic understanding of how internal combustion engines work, and can safely use a range of common automotive tools to complete standard automotive maintenance and repair procedures. Students who complete Transportation Trades 11 with a teacher who has trade certification will be awarded apprenticeship time for course hours logged in their Learning Journals.

The Nature of Transportation Trades 11

Transportation Trades 11 might offer the most striking example of why the "Hands on- Head's in" motto that has been coined for all Skilled Trades courses in Nova Scotia high schools is so appropriate. Throughout the course students are confronted with a daily roster of "hands on" task such as disassembling and reassembling engines, brake systems, and a variety of other automotive systems and components. However, to complete each of these "hands on" tasks safely and correctly requires reading and comprehending detailed technical information and documentation describing very precise and typically sequential procedures. This is the "head's in" component of life in the transportation trades, which is why automotive service technicians, other automotive professionals, and students in Transportation Trades 11 are always reading and using a wide range of documents.

Most students who show up on the first day of Transportation Trades 11 are there because of the "hands on" portion of the motto. They can't wait to get their hands on some tools and to begin taking apart an engine and getting up close and personal with the car and all of its systems and components. Most of them would likely agree with the young man whose statement "Reading Don't Fix No Chevys" serves as the title of a well-known book by Jeffrey Wilhelm and Michael Smith exploring the role that literacy plays in the lives of young men. The "head's in" reality of the having to review a significant amount of technical information before the so called "hands on" work even begins will come as surprise to them. Some may struggle with, and possibly even resist, the fact that when stripped to its basic essence, Transportation Trades 11 is essentially an applied language arts course primarily focused upon reading, document use, and technical communication. Even other essential transportation trades skills such as thinking, computer use, and continuous learning all rely heavily upon accessing and keeping up-to-date with a constantly increasing body of literature detailing the technical complexities of modern vehicles.

To simulate the "Hands on-Head's in" realities of life in the Transportation Trades, students, working in teams, are consistently challenged to use technical information to complete a series of hands-on projects with a real car, a real engine, and a real trailer. Teachers provide support and guidance, but students are encouraged to take responsibility for sifting through all of the information provided and determining how to safely carry out the steps required for tasks such as disassembling the engine, servicing the car's brakes, and installing and wiring the trailer with a set of lights.

The good news is that Transportation Trades 11 ultimately expands conventional notions of literacy. It opens doors to literacy development for reluctant readers and writers, by making them aware of how essential literacy is to "fixing chevys" and becoming successful in the transportation trades. For many students, this new understanding of literacy can be a life-changing event.

Because the Transportation Trades 11 curriculum involves students working on a newer model car, a recycled car, engines, and a trailer assembly inside the Skilled Trades Centre, instructional and shop space become merged into a single, organic, just-in-time learning environment. Within this environment students can immediately shift from reading a technical manual to actually applying the procedure it recommends, and teachers can immediately tie important lessons to the automotive service and repair-related activities being completed.

Within the Skilled Trades Centre, students in Transportation Trades 11 focus on four topical areas as they learn and apply the techniques required for working with engines and cars.

1) Transportation Trades Realities

2) Safety
3) Measurement and Calculation for the Transportation Trades
4) Tools and Materials for the Transportation Trades

Everyday students are guided through a learning process known as the Transportation Trades 11 Machine. The Learning Machine's three interlocking gears- Anticipation, Engagement, and Reflection- reflect the daily habits of reading and comprehending technical documents and translating this knowledge into effective service and repair actions on the shop floor. Students are taught to "anticipate", or plan, the steps, tools, and materials required, safety considerations, and potential challenges of working with engines and automobiles. After, planning their work, students "engage" in the task they need to complete each day. As tasks are completed, students are encouraged to "reflect" upon what they have learned, and how they will use this knowledge to "anticipate" and "engage" in future tasks.

At the beginning of Transportation Trades 11, students are given a Learning Journal. The Learning Journal keeps students Learning Machines operating at peak capacity by providing space for planning, recording, and reflecting upon completed tasks. As students continue to work on Transportation Trades 11's car, engine, and trailer, "anticipation" time shrinks, and "reflection" time grows, as student knowledge of the transportation trades increases.

Because time is of the essence within the transportation trades, the Learning Journal also provides students with a daily time card so that they can record the time required to complete service and repair tasks and activities. Students quickly learn that in car dealerships and service centres time is money and that automotive service technicians always need to work very quickly and efficiently.

Besides being more aware of time and working at a quicker pace than they did in Skilled Trades 10, students must also maintain strict safety standards when working with the numerous potential hazards associated with engines, cars, and the tools and materials required for servicing and repairing them.

Because Transportation Trades 11 is such a demanding course, students who eventually register for apprenticeship training will be awarded full credit for their hours worked in the Skilled Trades Centre if their teacher is a certified journeyperson in a designated trade.

Transportation Trades 11: Essential Graduation Learnings

Aesthetic Expression

In a famous essay about the 1960 Citroen DS19, French Philosopher Roland Barthes argued that modern automobiles were in their own way as beautiful as great gothic cathedrals. Transportation Trades 11 provides students with an opportunity to experience this beauty first-hand and to discover the complexity, intricacy, precise engineering, and essential components and systems that have inspired our intense love affair with automobiles for over 100 years now.

Through the exacting process of disassembling and reassembling a state-of-the-art 4-stroke, internal combustion engine, students discover the intelligence, discipline, and extremely deft touch that automotive service technicians must employ when working with engines and automotive systems. They also discover how precisely and carefully an engine's parts and components must be serviced and maintained if an automobile is to continue performing to its original capabilities.

Citizenship

In Transportation Trades 11 students are continually confronted with the incredible responsibility that tradespersons within the automotive services industry must have towards every driver within their community. A brake job, tire alignment, or any other service or repair not performed to standard can place a car's driver in serious danger that could potentially lead to a serous accident and even death.

Students learn that journeypersons within the transportation trades must take the responsibility they have towards their fellow citizens just as seriously as doctors, dentists, and any other professionals within our society who we count upon to ensure our health and well being by always performing their duties to the highest ethical standards.

Along with learning the responsibility that journeypersons within the transportation trades have towards their fellow citizens, students are also introduced to the Canadian automotive industry and made aware of the significant contribution that hardworking, productive journeypersons within this industry make to the Canadian economy through the goods and services they provide.

Communication

Reading, using documents, writing, communicating orally, and working with others are all defined by Human Resources and Skills Development Canada as essential skills for anyone working within the transportation trades. Students quickly discover that there is always a work order and a significant amount of technical documentation that must be read before a repair or service procedure can even be started. Students also learn that every car and every engine comes with its own set of documents that must be consulted to ensure that even simple tasks such as removing a basic component or part, or changing oil are done safely and correctly.

Students in Transportation Trades 11 are challenged on a daily basis to read and comprehend a variety of standard industry documents that include: repair manuals, recall reports, work orders, instruction and safety warnings on product labels, job estimates, warranties, inspection reports, accident forms, schematic diagrams, and diagnostic graphs. Students are also challenged to write out the steps required for standard repair procedures and to maintain a written log accurately documenting all of the work they complete on the Skilled Trades Centre's car and engine assemblies.

Besides reading and writing, students are also challenged through role-plays and group work to develop the appropriate oral communication skills required for explaining repair procedures to customers,

questioning customers and service advisors about what is wrong with a car, and responding to a customer complaint.

Personal Development

Students are immersed in the intellectual and physical realities of working within the transportation trades and introduced to numerous career opportunities within the automotive industry.

Students get to experience how basic scientific concepts that they have been exposed to throughout their academic careers directly apply to the development, performance, and maintenance of internal combustion engines and automobiles. Concepts such as power, torque, Newton's laws of motion, speed, velocity, acceleration, g-force, drag, friction, and inertia take on a whole new meaning within the real world context of Transportation 11 and motivate students to rediscover the useful insights and knowledge that science can offer.

Transportation Trades 11 challenges students to become more capable technical communicators as they learn to comprehend, interpret, and apply information contained within the manuals for the cars and the engine that they are working with in the Skilled Trades Centre.

Students completing Transportation 11 gain significant insight into how cars and engines work which will make them more knowledgeable consumers when shopping for cars or having them serviced or repaired. Students also learn to safely perform a number of basic car care tasks such as changing oil, checking tire pressure, and changing tires. These tasks are useful for any car owner to know.

Problem-solving

Working with engines and car systems involves constantly diagnosing and solving problems. Whether they are attempting to reassemble an engine, service a set of brakes, or safely jack up a car in the Skilled Trades Centre, students are going to encounter problems and difficulties that will need to be overcome to complete these tasks properly. Students will inevitably miss steps and attempt to install parts that don't seem to fit or go back together as expected. Faced with these challenges, students will need to pore over the manual for the car or engine to determine whether they have missed a part or misinterpreted a step, and find a way to resolve the situation. Just as in all Skilled Trades courses, students learn as much, if not more, from their mistakes as they do from their successes.

Technological competence

Working with cars and engine assemblies requires special tools. Students learn how to work with mechanics tools and a range of other tools and equipment that includes torque wrenches, flare kits, tire gauges, creepers, engine stands, and Vernier calipers.

Students also learn how to use a basic diagnostic scanner/code reader to identify some basic engine problems and to access CHILTONLibrary.com, an online collection of repair, maintenance, and service information for thousands of domestic and international models of cars and light truck from 1940 onward.

Students also make extensive use of word processing, spreadsheet, and presentation software to complete a variety of tasks, projects, and assignments throughout Transportation Trades 11.

Transportation Trades 11: Notes to the Teacher

Using the Transportation Trades 11 Course Tool Box

You have two invaluable resources to help guide your students on their journey through Transportation Trades 11:

1. Your expertise as a Red Seal, certified interprovincial journeyperson
2. The Transportation Trades 11 Course Tool Box

Let's take a brief look at all of the tools that the Transportation Trades 11 Course Tool Box has to offer.

Student Knowledge from Skilled Trades 10 and Construction Trades 11

The greatest tool you have at your disposal is the fact that all of your students have completed Skilled Trades 10. Some of your students may have also completed Construction Trades 11, which involved completing a large, complex building project.

What this means is that the students enrolled in your class for Transportation Trades 11 will be capable of

- Working safely
- Collaborating with other students on project teams
- Measuring and making precise calculations
- Reading and using plans, drawings, and other documents to complete projects
- Staying organized and completing projects with tight deadlines

Transportation Trades 11 Wall Chart

The Transportation Trades 11 Wall Chart provides a visual overview of all of Transportation Trades 11's elements to help you and your students make the most of the 110 hours of instruction available.

Besides providing a visual overview of all of Transportation Trade 11's elements, the wall chart also highlights a three part, cyclical learning process that you will challenge your students to apply, and to master, throughout the course. Three interlocking gears comprise the process that is labeled on the wall chart as the Transportation Trades 11 Learning Engine. Your job as the teacher is to use your experience, and all of the tools in the Course Tool Box, to keep each student Learning Engine working at maximum efficiency.

Let's take a look at each of the three interlocking gears:

Anticipate

Experienced transportation trades professionals think carefully and ask lots of questions before performing any service or repair. They know which tools to use and how long common repair and service tasks take. This knowledge enables them to work quickly and efficiently with what appears to be very little effort.

Most of your students will be unfamiliar with working with automobiles and engines and will need to think carefully about the tools and the steps required to complete even the most basic tasks and projects you assign, especially at the beginning of the course. That is why the arrow representing "anticipate" on the Transportation Trades Wall Chart is wider

at the start of the course, but progressively shrinks as students, with your help, begin to cultivate the daily habits and the mindset of an automotive journeyperson.

Engage

After students have "anticipated" and prepared for whatever Transportation Trades 11 task or project they are completing, the next step is perform the work required on the automobile or engine assemblies in the Skilled Trades Centre.

Students will mostly be exploring the various automotive systems and engine components by taking them apart and putting them back together. Whenever students are actively working with an automobile or an engine the "engage" gear becomes activated.

Reflect

Throughout Transportation Trades 11, you will be asking your students, after they "anticipate" and "engage", to " reflect" upon the automotive procedure or task they have just completed. This reflection is critical from a learning perspective to helping students digest the numerous skills and experiences they are encountering. It is also critical to making any adjustments required to align the Learning Engine's gears before they rotate again.

Challenging students to "reflect" upon automotive tasks or procedures also mirrors the realities of the automotive industry where technicians must document all of the service procedures and repairs they perform for their dealership's customers.

Transportation Trades 11 Course Model

The Transportation Trades 11 Course Model has been created to accompany the Transportation Trade 11 Wall Chart. Seven essential components for delivering the course are highlighted that provide a comprehensive introduction to life within the transportation trades.

The course model, combined with the wall chart, provide you with an excellent starting point for mapping out your course and for customizing it to serve the needs of you and your students.

Student Learning Journal

You need to provide all of the students in your class with Learning Journals. The Learning Journal provides your students with daily and weekly opportunities to demonstrate their participation in the course's "anticipate", "engage", and "reflect" learning cycle. Space is provided for writing down the steps and tools required for complete tasks, and for logging and reflecting upon daily activities completed. It also includes a daily time card so students can record the time required to complete service/repair tasks and activities.

The Learning Journal, along with your daily observations of students working on projects for the car, engine assemblies, and trailer, is critical to assessment for, and of, learning. You need to remind your students to use it everyday if they want to be successful in the course. You also need to schedule time each week to collect and review your student's Learning Journals so you can provide feedback. The Learning Journal also provides a great opportunity to get to know each of your students better and to gain a deeper insight into their experiences within the course.

Attention: Are you a certified journeyperson in a designated trade?
If you are, make sure that your students carefully log their hours everyday in the Transportation Trades 11 Learning Journal. Students taught by a certified journeyperson will receive full credit for

these hours if they decide to register as an apprentice. Please don't forget to sign your name and provide your certification number and trade in the specified areas on the title page.

Compact Car

Your Skilled Trades Centre contains a new compact car with no more than 2,500 km showing on the odometer. The car has been provided so that students can directly explore and learn about some of the essential systems and components it contains. During Transportation Trades 11 your students will take turns performing basic diagnostic tests and routine maintenance tasks on this car such as changing the oil and filter, and checking fluid levels. Your students will also be provided with opportunities for removing, re-installing and aligning or adjusting different parts of the car such as panels, components, glass & hardware, lights, and upholstery.

Two complete sets of shop manuals have been provided for you and your students to refer to as you work on and explore the car's various systems and components.

Recycled Car and Recycled Automotive Components and Parts

You will need to plan to find a recycled car within your community to use within your Skilled Trades Centre if you do not already have one available. The recycled car provides you and your students with opportunities to perform some basic bodywork (you can add dents to the recycled car's exterior if none exist) and to carry out some repair and service activities such as replacing the suspension or other parts and components that cannot be performed on the new car.

You can also use the recycled car to demonstrate to students the difference between a hard driven car with worn and torn parts vs. a new car that has been driven less than 2,500 kilometres. You may also want to obtain some recycled parts and components on an as needed basis to further demonstrate to students what worn tires, brake pads, windshield wipers, and other parts and components that require servicing actually look like.

Engine assemblies

Your Skilled Trades Centre also has a number of new or re-manufactured engine assemblies that match the one in the compact car. These engines have been provided for introducing students to the basic operating principles of 4-stroke, internal combustion engines. You will work with your students to complete a range of projects exploring the engine's top end, bottom end, and block. Here are some of the key engine components your students will be able to identify and describe by the end of Transportation Trades 11.

- Valve train (Intake, exhaust, timing)
- Cam shaft
- Combustion chamber
- Head gasket
- Piston rings
- Crankshaft
- Bearings
- Connecting rod bearings
- Oil pump & filter
- Engine block
- Cylinders

- Cylinder heads
- Oil pan

Two complete sets of shop manuals have been provided for you and your students to refer to as you work with and explore the engine assemblies.

Trailer

Your Skilled Trades Centre is equipped with a basic trailer or trailer assembly that can be used for a variety of projects that include:

- Installing lights and wiring
- Attaching to the Skilled Trades Centre's car with a trailer hitch
- Cleaning and re-packing the trailer's wheel bearings
- Manufacturing fenders

Tools

Working with cars and engine assemblies requires special tools. Your Skilled Trades Centre has been supplied with mechanics tool sets and a range of other tools and equipment that include torque wrenches, flare kits, tire gauges, creepers, engine stands, and Vernier calipers.

You will be provided with a complete list of all of the tools and equipment the Department of Education has supplied for Transportation Trades 11. Review this list carefully before the beginning of term to confirm that you are not missing anything.

Dealership/ Garage Tours

Dealership and garage tours are essential to providing your students with a complete introduction to the realities of working in the Transportation Trades. You should budget for two tours, one near the beginning of term, and one near the end of the term.

The goal of the first tour is to provide some initial context for your students who will likely have little, if any, knowledge of a what it is like to work in a dealership and how automotive technicians, services agents, parts persons, sales representatives, and managers work together to service, repair, and sell cars, trucks and other types of vehicles.

The goal of the second tour is to help students integrate and reflect upon all of their learning from Transportation Trades 11. Armed with significantly more knowledge, they will be able to ask more meaningful questions and better able to grasp the many activities taking place within a dealership.

Ideally, you set aside a day for each tour so that you can visit two or three different kinds of dealerships garages so that your students will see a variety of different engines and vehicles being worked on (cars, trucks, boats, motorcycles etc.) and be exposed a variety of potential working environments. Possibilities include:

- Dealerships for major car manufacturers (Toyota, Ford, Hyundai, GM)
- Farm machinery and equipment repair companies
- Local Canadian Tire dealerships
- Independent garages and service stations
- N.S. Department of Transportation repair and service depots

Chilton's Online Automotive Repair Database

Anyone with a library card from one of Nova Scotia's regional libraries can access CHILTONLibrary.com, an online collection of repair, maintenance, and service information for thousands of domestic and international models of cars and light trucks from 1940 onward.

Information from CHILTONLibrary.com includes diagnostic trouble codes, step-by-step instructions for repair, services and maintenance procedures, photographs, diagrams, illustrations, videos, and animated graphics.

You will need to ask all of your students to stop by a public library branch the first week of class to sign up for a library card if they do not already have one. This is a great opportunity to expose your students to the public library system and the many helpful resources and programs it has to offer.

Transportation Trades 11 Library

Your Skilled Trades Centre contains a number of textbooks that you can use to learn about engines and other automotive systems you will be exploring with your students.

You have also been provided with a specific set of exercises and activities from Jack Erjavec's Automotive Engine Performance that we recommend using when working with your students to learn about the engine assemblies.

[Provide a complete list of all of the textbooks that have been ordered for each of the Skilled Trades Centres]

Teaching Occurrences Assigned to 6 Cylinders

Your course toolbox contains XX teaching occurrences you need to integrate into the course as students work with the car, engines assemblies, and the trailer. The learning opportunities these teaching occurrences provide are not just busy work; they are tightly embedded within, and emerge directly from the exploratory activities taking place.

The XX teaching occurrences have been assigned to six cylinders that you can draw upon to power the course from class to class and week to week:

1) Safety
2) Essential Skills
3) Business Realities
4) Trades Exploration
5) Basic Car Care
6) Green Trends

These cylinders highlight and place the skills and knowledge essential to life in the transportation trades within the valuable real world context that the car, engine, and trailer projects provide.

For every teaching occurrence, you are provided with the following information:

- A background explanation of why it has been included
- The cylinder (s) to which it applies
- An activity for integrating it into the course

Week by week, as you work through the car, engine, and trailer tasks, skim through the list of potential teaching occurrences and develop a weekly teaching plan.

Course Rubrics

Rubrics have been created to help you assess student learning in Transportation Trades 11's four main project areas:

1) Car
2) Recycled car, components, and parts
3) Engine Assemblies
4) Trailer

These rubrics have been assigned with both assessment for, and of, learning in mind and are meant more as guides that you can draw upon than as definitive grading and evaluating tools.

Setting the right tone

Transportation Trades 11 is completely based on a series of projects that promote experiential learning. Consequently, the classroom atmosphere in the Skilled Trades Centre must be "safe" for your students in two senses of the term. In the physical sense, workplace safety standards must be followed at all times. In another sense, the Skilled Trades Centre must provide a psychologically safe environment in which your students are free to try new, demanding tasks. In experiential learning, mistakes serve as stepping stones to mastery. To develop the self-confidence to learn from their mistakes, your students need plenty of time to perform tasks and refine techniques.

You can foster a safe environment by holding yourself and your students to a high standard of respectful behaviour. Students need to learn by example not just how to handle tools properly but also how to manage emotions and relationships effectively. They need your help to develop patience with themselves and others, perseverance, and polite ways to deal with frustration and conflict.

It is also important that you find ways to share the years of experience you have working in the trades with your students . Try to think back to your own experiences as an apprentice and the many lessons you have learned to become the journeyperson you are today. Think about what worked, and what didn't work, and don't be afraid to reveal some of the mistakes you made along the way as this will make it easier for your students to identify with you.

Maintaining safety standards

Just as it is in Skilled Trades 10, "safety first" should also be your mantra in Transportation Trades 11. Before beginning to take apart an engine, or removing a panel from the car for the first time, you should review safety standards and procedures. As your students lead Tool Box Meetings (tool demonstrations), or complete the Job Safety Analysis process, you should similarly emphasize safety precautions. You need to practice as well as repeat safety instructions over and over until you are confident that everyone in your class is routinely following them.

Incorporating guest speakers

There are fewer opportunities for guest speakers in Transportation Trades 11 because the car, engine, and trailer projects require most of your daily class time. However, one possibility you should strongly consider if you have little experience working with cars and engines is to invite experienced journeypeople from your community to help you introduce basic concepts and share their on-the-job experiences.

Another interesting possibility you may want to consider is inviting local tradespeople to work alongside your students in the Skilled Trades Centre. An hour working with an experienced

journeyperson can provide lessons and memories that students will never forget. It is also a great way to introduce students to the critical role that mentorship plays within any of the skilled trades.

To make course planning manageable, you should create the schedule for potential guests at the beginning of the semester.

Exploiting digital technologies

Since today's adolescents have grown up with digital technology pervading daily life, you may find that using such technology helps engage students in curriculum topics. Digital technologies can enhance activities that involve research, presentation, and collaboration. Possible ways to incorporate digital technologies in Transportation Trades 11 include the following:

- Your students can use computers in the Skilled Trades Centre, and possibly at home, to access ChlitonLibrary.com, an online collection of repair, maintenance, and service information for thousands of domestic and international models of cars and light trucks from 1940 onward.
- Your students can prepare and deliver brief presentations using word processing and slide presentation software
- Your students can watch animations and videos to learn how engines, braking systems, and a variety of other automotive systems and components work. Videos where standard service and repair procedures are demonstrated are also available.
- Your students can go online to research careers in the Transportation Trades and to obtain a wealth of industry information.
- You and your students could potentially participate in a Transportation Trades 11 Blog
- You could create a Transportation Trades 11 website for your course

Making teamwork work

Since teamwork plays a vital role in Transportation Trades 11, you should invest ample time in discussing team dynamics, and establishing clear expectations for teamwork.

You should consider carefully the composition of your student teams, taking into account various levels of ability and interests. Wherever possible, you should foster diversity in your teams. At the same time, you need to ensure that team members share responsibility for completing projects. To promote participation and accountability, you may want to make peer and self assessment part of the evaluation process for some of the car, engine, and trailer projects.

Suggested teamwork resources

- Gillies, R. (2007). Cooperative learning: Integrating theory and practice. Thousand Oaks, CA: Sage Publications
- Jaques, D. (2007). Learning in groups: A handbook for improving group work. Abingdon, UK: Routledge.
- Joliffe, W. (2007). Cooperative learning in the classroom: Putting it into practice. Thousand Oaks, CA: Sage Publications
- Johnson, D;Johnson, R.T; & Holubec, E. Cooperative Learning in the Classroom. Alexandria, VA: ASCD

Transportation Trades 11 Course Model

Seven Essential Components for Introducing Your Students to What It is Like to Make a Living Servicing and Repairing Cars, Trucks, and Other Vehicles

Introduction

The Transportation Trades 11 Course Model has been created to accompany the Transportation Trade 11 Wall Chart. Seven essential components for delivering the course are highlighted that provide a comprehensive introduction to life within the transportation trades.

Throughout the course model, you are provided with the reasons each component has been selected and is essential to Transportation Trades 11. While you are strongly encouraged to cover all of the components included, there are no hard and fast rules about how best to organize and deliver the course. The primary purpose of this course model and wall chart are to provide you with a starting point and a detailed course map that can be customized to serve the needs of you and your students.

Component #1: *Introducing Students to the Canadian Automotive Industry and to Life and Work Within Dealerships and Service Centres*

One of the biggest challenges you face in Transportation Trades 11 is introducing students to the realities of a completely service-based industry. While the car and the engines you have been provided with provide plenty of opportunities for exposing students to what it is like to service and repair vehicles, it is simply not possible to recreate a real working dealership or service centre with a customer services desk, parts department, possibly a sales show room, and multiple bays and hoists where work on a number of cars is all taking place at the same time.

Given this challenge, it is imperative that before Transportation Trades 11 even begins that you plan student tours to automotive dealerships and services centres within your local community. This will be the only way for you to truly introduce students to some of the working realities of the automotive industry. Students need to be able to have a sense of where the work they are doing in Transportation Trades 11 would be performed within a service centre and to know where it fits within the larger picture of the automotive industry.

If possible, set aside two different days, one near the beginning of the course and one near the end, for your students to tour two or three different kinds of facilities. This will enable your students to see a variety of different engines and vehicles being worked on (cars, trucks, boats, motorcycles etc.) and to be exposed to a variety of working environments. Possibilities include:

- Dealerships for major car manufacturers (Toyota, Ford, Hyundai, GM)
- Farm machinery and equipment repair companies
- Local Canadian Tire dealerships
- Independent garages and services stations
- N.S. Department of Transportation repair and service depots

When touring these working environments make sure that your students note and ask questions about some of the following key topics:

- The pace at which work proceeds and some standard times budgeted for common repairs and service procedures such as an oil change or brake replacement
- The incredibly specialized nature of work at many dealerships and service stations today and the impact this is having upon career paths with the Transportation Trades

- An overview of all of the potential jobs and career paths that students might follow within the automotive industry such as:
    - Owner
    - Executive manager
    - Sales representative
    - Parts person
    - Automotive technician
    - Customer service specialist

It is critical that your students, especially those who discover that they are not cut out to be automotive service technicians, are aware of the many different career paths for people who love cars and want to work within the automotive industry.

You may want to consider contacting the Automotive Trades Association, the Automotive Sector Council of Nova Scotia, and the Nova Scotia Automobile Dealers Association. All of these organizations can provide you with some assistance and possibly some resources to help introduce students to the broader context of the automotive industry within Nova Scotia. A representative from one of these organizations may even be able to visit the Skilled Trades Centre to deliver a presentation. Here are website addresses for all three of these organizations:

- Automotive Trades Association (www.ataatlantic.ca)
- Automotive Sector Council of Nova Scotia (www.automotivesectorcouncil.ca)
- Nova Scotia Automobile Dealers Association (www.nsada.ca)

Component # 2: *Working safely*

Safety is always the first item on the agenda and an essential ingredient in any skilled trades course, and Transportation Trades 11 is no exception. Before your start working with engines and the car in the Skilled Trades Centre, and throughout Transportation Trades 11 you will need to ensure that students know how to safely use the unique set of tools and materials required for working with cars and engines. Your students are familiar with Tool Box meetings from Skilled Trades 10, which you can use to introduce new tools such as the torque wrench and jack that students will be making extensive use of in Transportation Trades 11.

Every time your students are performing a new task ask them to take quickly complete a Job Safety Analysis (JSA) worksheet to ensure that they know how to use any tools required, are aware of the task's essential steps, any potential hazards it poses, and the preventative measures they need to take to stay safe.

You can also discuss what transportation trades professionals can do to stay fit and to avoid or alleviate some of the stresses on their body that can potentially shorten a career.

Component #3: *Working with real cars and engines and constantly taking advantage of the learning opportunities that this provides*

After you have introduced students to the broader context of the automotive industry and reviewed basic safety concerns it is time to start working with the engines and car in your Skilled Trades Centre.

Transportation Trades 11 is based upon experiential learning principles. A real car has been provided so that students can directly explore some of the essential systems and components it contains. By the end of the course, every one of your students should have participated in the performance of some basic diagnostic tests and routine maintenance tasks such as servicing brakes, changing the oil and filter, and checking fluid levels. Make sure that each of your students truly is

taking the lead on at least one of the tasks performed and provide as little guidance as possible. A big part of working with cars is encountering challenges or things that don't make sense and struggling to find a solution. If you smooth out some of the rough spots for your students their experience will not be nearly as rewarding and fail to simulate the reality that automotive technician's face every day of being responsible for completing all of the work performed on a car.

Four real engines have also been provided so your students can learn first-hand the basic operating principles of 4-stroke, internal combustion engines. As with the car make sure that your students complete a range of projects exploring the engine's top end, bottom end, and block. As your students are working with the engines take advantage of the numerous opportunities you will have to reinforce the importance of safety and to review the proper use of tools and the proper care and handling of all of the parts and components that students will be removing from the engine and later reassembling.

Students will need to be encouraged to be gentle when working with engines and to exert only as much force as is necessary with the appropriate tool when removing various fasteners and parts. It will also be critical to ensure that students are well organized and have a plan that involves carefully labeling and laying out every part or fastener removed from the engine as training yourself to be extremely methodical is a critical aspect of success within the transportation trades.

You will need to introduce your students to the mechanic's tool set that they will be working with and a range of other tools and equipment that includes torque wrenches, flare kits, tire gauges, creepers, engine stands, and Vernier calipers. Every tool, and the tasks for which it has been designed, provides a tremendous learning opportunity. As noted earlier, knowing which tool to use in a given situation is a fundamental capability that an automotive technician must become adept at if they don't want to alter or damage a part or component they are working on.

As your students work with the cars and the engines, take advantage of every opportunity to get students to measure the parts and components they are encountering. Even if a measurement is not necessarily called for, get them to grab a Vernier caliper or other measuring tool and practice making it. Be sure to highlight how much more precise measurements and tolerances are within the transportation trades than they were for any of the projects students completed in Skilled Trades 10. Some students will love working with incredibly precise measurements and other will find it extremely difficult, so it is critical that students experience this reality first hand.

Component # 4: ***Exploring basic car science***

As you work with the car and the engines in Transportation Trades 11, you will discover a wealth of opportunities for introducing car science lessons. You must take advantage of as many of these opportunities as possible to reinforce the fact that Transportation Trades 11 is a legitimate academic credit.

Students never believe that anything they learn in math or science has any relevance to the real world and you will be able to put this notion to rest every day by revealing the fundamental scientific concepts that are essential for anyone working with cars and engines. You can explain to students that you don't have to be Einstein to work in the Transportation Trades but that you do need to know some basic math, physics, and chemistry if you want to become a successful automotive service technician or other Transportation Trades professional.

To help keep your car science efforts focused you may want to use the following four-part framework and prepare lessons for a number of the suggested topics. Power, speed, and handling were chosen as these are the three critical areas where scientific researchers and engineers have

constantly sought improvements focused since cars were first invented. These are also the areas that car reviewers always focus upon when rating a new car's overall performance. The area future developments was chosen because of the rapid new advances that being made in the development of hybrid and electric cars. Students need to be aware of theses rapid advancements, which will quickly become a major part of the life in the transportation trades in the coming years.

Power

Suggested Topics:

- How internal combustion, four-stroke engines work
- How to increase an engine's power
- Understanding torque
- Exploring Newton's three laws of motion
- How to generating more automotive force: Levers, gears, wheels, and hydraulics

Speed

Suggested Topics:

- Distinguishing between speed, velocity, and acceleration
- Understanding basic aerodynamics and the science of airflow
- Investigating drag, downforce, and Newton's 3rd law

Handling

Suggested Topics:

- Handling-Tires and the science of friction
- Cars and inertia
- Cars and G-force
-

Future Developments

- Moving beyond the gasoline engine: Electric, hybrid and fuel cell cars

Information about all of the suggested topics is available on the Internet. You could assign these topics to students and ask them to create presentations explaining these topics to your class or you can prepare your own lesson plans. Whatever approach you take, it is important to tie the scientific concepts being discussed to the engines and the car. For instance, if you are discussing torque, you need to jack the car up and have students slide underneath it to locate the cranks, crankshaft, gearbox, and wheel axle that make up the power train. You may also want to provide students with a standard diagram of the car's power train as a visual aid to reinforce how all of these parts work together to turn the cars wheels.

Another obvious example is the internal combustion engine. As students take apart the engines in the Skilled Trades Centre, you can identify the pistons, spark plugs, inlet valve and the other key components found in an internal engine and walk students through the four-stroke simulation. Make sure you emphasize just how fast everything is moving as students may not be aware of the incredible speed and precision at which car engines operate. It can be extremely awe inspiring to realize that when a car's crankshaft is doing 5000 rpm that this works out to be 83 revolutions per second and that this is not even the maximum rate at which it can spin. There will be many more mind boggling moments throughout Transportation Trades 11 that you need to constantly keep an eye out for and to tell your students about as these are the truly cool things about cars and car engines that students will find fascinating.

Component #5: *Introducing basic auto body repair*

After you have spent some time exploring the car's engine and some of its internal systems such as the brakes and the power train, you should shift the focus to the body of the car. Auto body repair is a big part of the transportation trades that many of your students, especially those with a more artistic flair, will find tremendously appealing. To make this happen, you will need to do some searching within you local community to find an older car, or what would commonly be referred to as a junker, to use in the Skilled Trades Centre.

Once you find the car and arrange to have it driven or towed to your school, you can have your students repair any existing dents or other damage that the car has sustained. If the body is in good shape, you can deliberately make some dents in the car and ask your students to repair them using some basic auto body repair techniques.

[Ask John for details about what Ferry is doing at Annapolis. We can include these here as suggestions for other teachers to use]

You could also have interested students put racing stripes or other designs on the car to learn the process involved in completing this kind of work.

While securing a junker may be a bit of work, do whatever you can to make this take place as it is a great way for students to directly experience some of the realities of auto bodywork, which is another prominent career opportunity within the transportation trades.

Component #6: *Student Projects*

Communication skills and literacy are such a fundamental aspect of life in the transportation trades that you need to challenge your students, working in teams of two, to complete two brief projects that they will present to the rest of the class during Transportation Trades 11. You will need to review the two projects and schedule time slots for 16 student presentations week-by-week throughout the term or block off some time every few weeks for multiple groups to present.

Project #1

Your first project can focus upon a general topic related to the automotive industry. Some possible topics might include:

- The historical evolution of a specific aspect of the automobile such as the engine, body design, or safety
- An overview of the automotive industry
- A pioneer within the automotive industry such as Henry Ford
- A brief history of a famous car such as the Corvette, Mustang, or Ferrari

You can also encourage students to create their own topics if there is a particular aspect or area of the automotive industry that they are keen to explore.

Project # 2

There is not enough time in Transportation Trades 11 for students to experience all of the potential trades that are available within the automotive sector. This is why we every week or two you must assign a group of two students to research and present some of the other transportation trades.

Here is a list of trades to consider:

- Automotive painter
- Motorcycle mechanic
- Motor vehicle body repairer
- Partsperson
- Recreation vehicle service technician
- Truck & transport mechanic
- Transport trailer technician

You and your students may have other trades that you would like to add to this list.

An additional project possibility that you may want to consider is having your students research and present career opportunities in the following three transportation trades industries:

- Aerospace
- Marine
- Rail

Students could identify a specific trade within one of these industries or provide an overview of the range of career opportunities for tradespersons within each of these industry sectors.

Component #7: *Simulated Car Service/Repair*

After students have visited a dealership or service centre, and completed a number of car and engine projects in the Skilled Trades Centre, you can tie everything together by setting up a combined role play and service/repair project. Your goals with this project is to simulate the communication service loop that take place in a dealership or service centre when a customer shows up at the service desk to report that their car needs to be serviced or repaired.

You may want to consider dividing your class into groups of four students and having each group participate in four different simulations with a different service or repair issue each time so that each student get to play the following roles:

- Customer
- Customer Service Representative
- Automotive Service Technician
- Parts Person

You can use tables and chairs within the Skilled Trades Centre to create a customer service desk and a parts department. We recommend asking a local car dealership or service centre to provide you with samples of the following forms/documents that are used throughout the process. These will likely include the following:

- A form for the customer service representative to record the customer's description of what is wrong with his or her car or the basic service requested.
- A form for the Automotive Service Technician to report what actions he or she has taken to repair or service the car (may be another part of the same form the Customer Service Representative uses)
- A form for requisitioning and recording whatever parts and materials are required from the dealership or service centre's inventory

The key thing to emphasize with students and to get them to reflect upon after each role- play is the very organized, focused process that automotive service professionals follow every time a customer brings a car to their dealership or service centre. You can also highlight the communication challenges that the customer, the customer service representative, and the automotive service Tratechnician face in attempting to diagnose and repair an automobile.

Component #1: (Revisited): ***Returning to Dealerships and Service Centres***

Near the end of Transportation Trades 11, after you students have become much more familiar with cars, engines, and other aspects of the automotive industry, set up another tour of some dealerships and service centres. Your students will amazed by how much more insight and knowledge they have than when they went on the first tour. A second tour is also a great way for you to bring the course full circle and to encourage students to reflect upon everything that they have learned in the course. It also gives students who are seriously thinking about becoming transportation trades professionals another chance to experience real working conditions.

Transportation Trades 11 Outcomes

Students will be expected to

Cluster 1: Transportation Trades Realities

SCO 1	demonstrate an understanding of the nature of work and working conditions in the transportation trades
SCO 2	identify the work of Automotive Service Technician, Heavy Duty Equipment Technician, Motorcycle Mechanic, Motor Vehicle Body Repairer, Partsperson, Recreation Vehicle Service Technician, Transport Trailer Technician, Truck and Transport Mechanic and the roles and responsibilities of people working in those trades
SCO 3	demonstrate an ability to sequence tasks
SCO 4	recognize established work specifications in the transportations trades and perform work meeting those specifications
SCO 5	model the employability skills required for successful employment in the transportation trades
SCO 6	produce appropriate artifacts for their LifeWork Portfolio to demonstrate learning throughout Transportation Trades 11

Cluster 2: Safety

SCO 7	identify and understand the importance of reporting safety risks and hazards in the workplace
SCO 8	demonstrate an understanding of, and apply, workplace health and safety practices and procedures in various work situations
SCO 9	properly use and maintain personal protective equipment
SCO 10	demonstrate knowledge of how to use tools and equipment safely

Cluster 3: Measurement and Calculation for Transportation Trades

SCO 11	interpret trades-related specifications, graphs, and measurements
SCO 12	demonstrate an ability to estimate length, area, volume, mass, and time
SCO 13	perform trades-related calculations
SCO 14	demonstrate the ability to measure values using various systems of measurement

Cluster 4: Tools and Materials of the Transportation Trades

SCO 15	demonstrate an ability to use and interpret trades-related documents, specifications, and drawings
SCO 16	demonstrate an ability to use and maintain tools and equipment in a safe, accurate, and appropriate manner
SCO 17	demonstrate the ability to identify, use, store, and properly dispose of materials and hazardous products in a safe, responsible, and sustainable manner

Teaching Activities

Safety

#1	Introducing Safety in the Transportation Trades
Background:	Students learned in Skilled Trades 10 that safety is always the first priority in any trade. You need to reinforce this on the first day of Transportation Trades 11 by reminding students that safety is not something you learn and forget about, but something that you keep practicing everyday. Students also learned how to hold Toolbox meetings and perform a Job Safety Analysis (JSA). You can let students know that they will continue to practice these important safety procedures in Transportation Trades 11.
Activity:	Spend a few minutes reviewing some of the potential hazards associated with working on cars and engines. You could also introduce a tool such as the torque wrench that students will be using throughout the course and hold a Tool Box meeting focused upon its safe use. Explain to students that most days you will spend a few minutes on safety, especially when a new tool like the torque wrench is being used or a new procedure is being introduced. Take students to the page on the WorkSafe BC website where materials for a series of 25 6-minute safety talks for apprentices in the automotive trades are available. Tell your students that you plan for each of them to deliver one of these 6-minutes talks in the coming weeks. Here is the link to the page from WorkSafe BC's website: http://www2.worksafebc.com/Topics/YoungWorker/Apprenticeship-Automotive.asp A brief guide for instructors and a handout for student is provided for each of the 6-minute safety talks.
#2	Leading a Tool Box Meeting
Background:	Your students will be using a number of new tools in Transportation Trades 11. You need to budget time throughout the course to ensure that all of your students know how to safely use every tool. Toolbox Meetings and Toolbox Meeting Checklists provide a rigorous approach for teaching tool safety. Students were introduced to Toolbox Meetings in Skilled Trades 10.

	The process takes time to complete, but the checklists generated provide an excellent way of confirming that your students know everything required to safely operate new tools.
Activity:	Pick three or four tools that students will be using to complete upcoming project tasks and perform a demonstration using the Toolbox Meeting process. Students were introduced to the Toolbox Meeting process in Skilled Trades 10, and should already be knowledgeable about how to prepare checklists for the tasks or tools you will be demonstrating. You can design your own checklists and guides or use the materials provided by Work Safe BC as models. Work Safe BC Tool Box Meeting Check list http://www2.worksafebc.com/i/construction/toolbox/pdfs/TG06-00_Checklist.pdf You may want to create a Toolbox Meeting schedule at the beginning of the course, and assign students to work with you to demonstrate and review the safe use of new tools that are about to be used. Explain to students that there are no "short cuts" where safety is concerned, and insist upon holding Toolbox Meetings and creating Toolbox Meeting checklists before using a new tool. You should also closely supervise students, especially when they first start using a new tool, to confirm that they are working safely.
#3	Performing Job Safety Analysis (JSA)
Background:	Your students will be using a number of new tools in Transportation Trades 11. You need to budget time throughout the course to ensure that all of your students know how to safely use every tool. The Job Safety Analysis (JSA) process and the Job Safety Analysis worksheet provides a rigorous approach for teaching tool safety. Students were introduced to both this process, and the worksheet in Skilled Trades 10. The process takes time to complete, but the worksheets generated provide an excellent way of confirming that your students know all the steps required to safely operate new tools.
Activity:	Pick three or four tools that students will be using to complete upcoming project tasks and perform a demonstration using the Job Safety Analysis (JSA) process.

<table>
<tr><td></td><td>Students were introduced to the Job Safety Analysis Worksheet below in Skilled Trades 10 and may already be knowledgeable about how to fill it out for the tasks or tools you will be demonstrating.

Job Safety Analysis Worksheet<table><tr><td>Task/ Tool</td><td>Essential Steps</td><td>Potential Hazards</td><td>Preventative Measures</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>Source: Canadian Centre for Occupational Health and Safety

Explain to students that there are no “short cuts” where safety is concerned, and insist that they all properly fill out a JSA worksheet before using a new tool. You should also closely supervise students, especially when they first start using a new tool, to confirm that they are working safely.</td></tr>
<tr><td>#4</td><td>Highlighting the Most Common Injuries in the Transportation Trades</td></tr>
<tr><td>Background:</td><td>Because of the kinds of work performed and the tools and materials used, every trade has some injuries that are more common than others. Most of these injuries are not life threatening, but they can be debilitating and cut short an otherwise productive, rewarding career. Because of this, it makes sense to take whatever precautions are necessary to avoid these injuries.</td></tr>
<tr><td>Activity:</td><td>Ask a student or a group of students to research the most common injuries that take place within the transportation trades. You may want to pick a particular trade such as Automotive Service Technician to help keep things focused.

Explain that you would like them to present the list that they compile to the rest of the class and discuss strategies and precautions that a journeyperson can take to avoid these injuries and to extend the length of their career.

Your goal for this activity is to demonstrate to students that even the most commonly occurring injuries within the transportation trades can be avoided by being careful and taking necessary precautions.

You may want to start or end this activity with the WorkSafe BC 6-minute safety talk “Safety on the Job “, which explains that young workers are at a much higher risk of injury than workers of any other age group and that more than half of workplace accidents involving workers aged 15 to 24 occur during the first six months on the job.

http://www2.worksafebc.com/Topics/YoungWorker/Apprenticeship-Automotive.asp</td></tr>
</table>

#5	Reviewing Material Safety Data Sheets (MSDS) for Automotive Materials
Background:	Automotive Service Technicians and other journeypersons working in the Transportation Trades spend a significant amount of time handling and disposing of potentially hazardous materials. These materials include: motor oils, lubricants, antifreezes, and a large number of chemicals and fluids. Students learned how to skim Workplace Hazardous Materials Information Systems (WHMIS) labels and Material Safety Data Sheets (MSDS) for relevant information but you need to insist that they continue put this skill to use any time they are working with, or around, any potentially hazardous automotive materials.
Activity:	Go to the company Service Pro's website and select the MSDS link. The URL is directly below: http://www.service-pro.com/ Read through the MSDS for 10W40 motor oil with students, explaining the strategies you use to extract essential information. Tell students not to become frustrated if, even after you have worked through the MSDS together, they are still confused. Explain that even experienced tradespeople have difficulties reading MSDS sheets and need to ask someone else for help or confirmation as to how to proceed. A study completed by the U.S. Navy revealed that may workers become more capable using MSDS sheets if they are taught analogies for some of the more difficult technical terms that are typically used. The article below provides 10 helpful analogies for common MSDS terms that were successfully used in the U.S. Navy study. You could potentially share this article with students, and work through some of the analogies. You could also use the analogies from the article as a starting point for developing your own analogies for some of the difficult terms from the MSDS for 10W40. How to Decipher Material Safety Data Sheets: Analogies Help Workers Remember Complex Technical Information http://www.ishn.com/Articles/Feature_Article/0d59afadc9fb7010VgnVCM100000f932a8c0 Industrial Safety and Hygiene News Dean Larson & Susan Boyd May 5, 2000

Basic Car Care

#1	Finding and Using a Vehicle's VIN Number
Background:	Every vehicle has a unique VIN number. Students need to know where to locate the VIN number on any vehicle and to be aware of the valuable role that it can play.
Activity:	Assign a student, or a group of students, to research what a VIN number is, to show where it is located on the Skilled Trades Centre's car, and to explain the valuable role that it can play in servicing a car that an Automotive Service Technician has not worked on in the past.
#2	Checking Tire Pressure
Background:	Checking tire pressure is a routine part of basic car care that anyone who owns or drives a vehicle should know how to do.
Activity:	Assign a student, or group of students to learn how to use a tire gauge and to check the tire pressure on the Skilled Trades Centre's car. Ask them to provide you with a written list of the steps required to properly check tire pressure and to explain why car owners regularly need to check the pressure of their tires. You can repeat this assignment with other students or groups of students or have your original group demonstrate to the other students how to check tire pressure and explain why it is an essential maintenance activity.
#3	Changing Tires
Background:	Anyone who has driven for any length of time has likely had to change a flat, or damaged tire once or twice. Even if students never become Automotive Service Technicians, knowing how to safely change a tire is a useful skill that every driver needs to know.
Activity:	Assign a student, or group of students, the task of taking off one of the tires from the car in the Skilled Trades Centre and replacing it with the spare tire. Detailed instructions for completing this activity will be provided in the manual that comes with the car. Stress to students that you expect them to follow the guidelines and specifications provided and to not just dive in and start taking off a tire. Explain that a big part of being an Automotive Service Technician is poring over manuals to locate technical information and to confirm the correct procedures for installing or uninstalling parts or performing service and repair activities.

	You can repeat this assignment with other students or groups of students or have your original group demonstrate to the other students how to change a tire safely and properly.
#4	Changing Oil
Background:	Many people change their own oil, but it is a more complicated activity than checking tire pressure, changing a tire, or replacing a wiper blade. Because most car owners do not perform their own oil changes it is probably the most common routine service activity performed by Automotive Service Technicians. Because it is such a common activity, it is important for students to experience what is involved in changing a car's oil.
Activity:	Assign a student, or group of students, the task of changing the oil from the Skilled Trades Centre's car. Detailed instructions for performing an oil change will be provided with the technical manuals that came with the car. Stress to students that you expect them to follow the guidelines and specifications provided and to not just dive in and start changing the car's oil. Explain that a big part of being an Automotive Service Technician is poring over manuals to locate technical information and to confirm the correct procedures for installing or uninstalling parts or performing service and repair activities. You may want to review the page from SJM Autotechnik's website called the "The Art of Automotive Repair." SJM Autotechnik specializes in repairing Audi's and the content from this page notes the amount of knowledge and training required to perform even a simple activity such as an oil change. A detailed list of 13 questions that you need to answer when making an oil change are provided. The URL for SJM Autotechnik's page is provided directly below: http://www.sjmautotechnik.com/repair.html You can repeat this assignment with other students or groups of students or have your original group demonstrate to the other students how to change oil safely and properly.
#5	Maintaining, Charging, & Replacing Batteries
Background:	Most drivers will need to jump start their own, or another driver's car, so knowing how to safely charge a car's battery is particularly important. Maintaining and replace a car's battery are important activities as well that all drivers should know.

Activity:	Before you begin this activity you may want to have one of your students, or student groups, deliver WorkSafe BC's 6-minutes safety talk on batteries. Batteries can be extremely dangerous, so it is always critical to emphasize safety concerns whenever students are working with them. Assign a student, or group of students, the task of demonstrating the task of charging or replacing the battery from the Skilled Trades Centre's car. Detailed instructions for charging or replacing the battery will be provided with the technical manuals that came with the car. Stress to students that you expect them to follow the guidelines and specifications provided and to not just dive in and start charging or replacing the car's battery. Explain that a big part of being an Automotive Service Technician is poring over manuals to locate technical information and to confirm the correct procedures for installing or uninstalling parts or performing service and repair activities.
#6	Checking Fluid Levels
Background:	Checking to ensure that fluid levels are at appropriate levels is a critical aspect of basic car care that drivers and future Automotive Service Technicians need to know.
Activity:	You can assign a student, or a group of students with the task of checking some of the fluid levels within the Skilled Trades Centre's car. Common fluids you can get students to check include: Power steering fluid Brake fluid Automatic transmission fluid Engine oil Antifreeze You will need to instruct students to review the MSDS sheets and WHMIS labels for each of these fluids so that they are aware of any potential hazards and know what safety precautions and personal protective equipment they need to wear when dealing with these fluids. Students will also need to refer to the technical information provided with the Skilled Trades Centre's car to determine the

	proper steps and procedures for checking and possibly replacing, or topping up the different fluids. You may want to approach a local garage or service station and ask them to provide you with examples of dirty oil or fluid that needs to be replaced. Students can compare and contrast these samples with clean oils and fluids and begin to learn what to look for when performing standard maintenance procedures such as checking a car's oil.
#7	Changing Wiper Blades
Background:	Anyone who has driven for any length of time has likely had to change a damaged wiper blade once or twice. Even if students never become Automotive Service Technicians, knowing how to safely change a wiper blade is a useful skill that every driver needs to know.
Activity:	Assign a student, or group of students, the task of taking off changing one of the wiper blades from the car in the Skilled Trades Centre. Detailed instructions for completing this activity will be provided in the manual that comes with the car. Stress to students that you expect them to follow the guidelines and specifications provided and to not just dive in and start changing the car's wiper. Explain that a big part of being an Automotive Service Technician is poring over manuals to locate technical information and to confirm the correct procedures for installing or uninstalling parts or performing service and repair activities. You can repeat this assignment with other students or groups of students or have your original group demonstrate to the other students how to change a wiper safely and properly. You can repeat this assignment with other students or groups of students or have your original group demonstrate to the other students how to check fluid levels safely and properly.

Green Automotive Trends

#1	Repairing, Not Replacing, Bumpers
Background:	We have suggested six green automotive trends for you and your students to explore throughout Transportation Trades 11. Green practices are becoming increasingly common within the

	automotive industry, so it is important for students to be aware of them. Traditionally if you are in an accident and there is a dent or a gouge in your bumper, the entire bumper is removed and replaced with a new one. However, new techniques have been developed for restoring the damaged part of the bumper so that it can continue to be used and does not end up in the landfill.
Activity:	Assign a student, or a group of students, to research the new technique for repairing, not replacing damaged bumpers. Ask them to explain how the technique is performed and to discuss all of the benefits it provides. After students have completed their research, they can do a brief presentation for the class about what they have found. You may want to plan for some of your students to remove the bumper from the Skilled Trades Centre's car on the same day to provide students with direct insight into how bumpers are constructed and attached to cars.
#2	Discovering Green Practices for Automotive Repair Garages & Service Stations
Background:	More and more automotive repair garages and service stations are taking a hard look at how they do business and coming up with more environmentally friendly practices for repairing and servicing cars. By the time your students enter the workforce most garages and services stations will likely be a lot green than they currently are.
Activity:	Assign a student, or a group of students to research green repair garages and service stations and describe how they differ from traditional garages and services stations. Ask them to also find out if how much it costs for a garage or service station to go green and if there are compelling business reasons motivating garage and service station owners to make this change.
#3	Recycling Auto Parts
Background:	Companies in most industries are doing everything they can to recycle materials. This is good for the environment and for their bottom line. What impact is this trend having within the world of automotive repair and services and if it is becoming more popular how does it work?
Activity:	Assign student, or a group of students to research whether recycled auto parts are becoming more common within automotive environments. Ask students to find out what

	advantages recycled parts have to offer and to find out if this trend is likely to continue or only a temporary fad. If possible, obtain a new and a recycled version of the same part to provide some context for your students.
#4	Controlling Automotive Emissions
Background:	Emission control systems are now a prominent part of the technology included within every car. Students need to know what kind of emission control systems are used and how they work to reduce the pollutant that automobiles generate.
Activity:	Assign a student, or a group of students to research emission control systems such as the catalytic converter, pcv valve, egr valve, and evaporative controls. Ask students to briefly describe some of the different emission control systems and to determine which of these systems is found on the Skilled Trades Centre's car.
#5	Exploring Hybrid and Electric Cars
Background:	Hybrid and electric cars are becoming more and more popular. However, most of the news articles only discuss these new cars from the perspective of potential car owners; not automotive service technicians. Are these cars harder or easier to service and repair and what are some of the key differences that automotive service technicians need to be aware of when working with these vehicles.
Activity:	Assign a student, or a group of student, to research how hybrid and electric cars differ from conventional cars and whether this makes them more challenging or interesting to service and repair.
#6	Improving Fuel Economy
Background:	Fuel economy is becoming a greater concern in vehicles as the price of gas rises. Students will find exploring what makes a car more or less fuel efficient an interesting exercise.
Activity:	Assign a student, or group of students to explore which aspects of an automobile have the greatest impact upon its overall fuel economy. Ask them to develop a list of the items that have the biggest impact upon fuel economy and to briefly explain why this is the case.

Business Realities

#1	Exploring Dealerships, Garages, & Service Stations
Background:	Dealership and garage tours are essential to providing your students with a complete introduction to the realities of working in the Transportation Trades. You should budget for two tours, one near the beginning of term, and one near the end of the term.
Activity:	Set aside a two different days, one near the beginning of the course and one near the end, for your students to tour two or three different kinds of dealerships, garages or service stations. This will enable your students to see a variety of different engines and vehicles being worked on (cars, trucks, boats, motorcycles etc.) and be exposed a variety of potential working environments. Possibilities include: • Dealerships for major car manufacturers (Toyota, Ford, Hyundai, GM) • Farm machinery and equipment repair companies • Local Canadian Tire dealerships • Independent garages and service stations • N.S. Department of Transportation repair and service depots You can ask your students to reflect upon what they learned from the tours in their Learning Journals.
#2	Working at the Speed of Industry
Background:	The primary focus in Transportation Trades 11 is learning about careers in the automotive trades and how to do things properly. There is no expectation in only 110 hours that students will become as skilled and capable as a journeyperson. However, it is still helpful for students to be provided with some insight into the pace at which experienced industry professionals work when performing standard maintenance procedures such as oil changes and tire changes.
Activity:	You can ask your students to contact a local garage, service station or dealership and find out how long they expect that it will take for their Automotive Service Technicians to complete oil changes and other standard maintenance procedures. Students may be surprised at just how fast and efficient Automotive Service Technicians need to be at a busy dealership.
#3	Investigating Specialization
Background:	Work in the Automotive Trades has become extremely specialized. Students who love working on automobile may not be aware of this and think that all Automotive Service Technicians and other automotive trades journeypersons work on all of the systems and components found within automobiles.
Activity:	You can ask your students to go onto the Internet or speak to automotive trades journeypersons within your community and investigate the degree of

	specialization within their jobs and whether this varies depending upon the repair garage, service station or dealership that they are working for. Students can reflect upon what they learn from their investigations in their Learning Journals and potentially arrive at some conclusions about where they would like to work if they decide to become a journeyperson in the automotive trades.
#4	Diagnosing Problems or Changing Parts?
Background:	Because cars are becoming more complicated, journeypersons more specialized, and the design of cars more dependent upon computers, some people argue that fewer Automotive Service Technicians are now capable of diagnosing a car's problems; that the standard practice at many garages and dealerships is too simply keep changing parts until a car's problem is resolved.
Activity:	You can ask your students to go online and read the article "The Lost Art of Diagnosing Engine Problem". Hemmings has an extensive series of "Lost Art" articles that some of your students may find very interesting to read. http://www.hemmings.com/mus/stories/2008/10/01/hmn_feature20.html After students have read and thought about the content of the article, you can print off copies and have a brief discussion about it at the beginning or end of class. You can also ask students to reflect upon the article in their Learning Journals.
#5	Communicating with Customers
Background:	No matter how talented your students become at diagnosing and fixing an engine's problems they will likely need to deal with customers throughout their career. Learning to do this effectively is critical to continued employment within the industry as repair garages, service stations, and dealership will only be successful if their customers are happy
Activity:	You can set up some brief role plays where your students: Explain regular vehicle maintenance procedures to customers. Speak to customers and service advisors to obtain information about vehicle repairs. Respond to customer complaints regarding quality, cost or duration of repairs. You can get as detailed as you want with these potential role plays. Your

	main goal needs to be to get your students communicating. You may want to build your role plays around work you are doing on the cars and engines. For instance, if some of your students are performing a procedure on the car, you can pretend to be the customer and get them to explain what they are doing in simple, understandable terms.

Essential Skills

#1	Introducing Essential Skills in the Transportation Trades
Background:	Students will already be familiar with essential skills from Skilled Trades 10. However, they will have little if any insight into the role that essential skills play within the automotive trades.
Activity:	You can introduce the Carsability website which provides an easy-to-use, interactive assessment designed to help students, apprentices, and employees in the automotive repair and service industry to assess their essential skills. www.carsability.ca/es/ You can also highlight the many different opportunities within Transportation Trades 11 for students to experience and practice the essential skills required for working within the automotive repair and service industry.

#2	Reading
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Read e-mails or notes from colleagues. Read comments on work orders to understand problems and repair schedules. Read instructions and safety warnings on product labels. Read reports from manufacturers describing recalls and faults of specific models of automobiles. Read repair manuals to diagnose and fix mechanical faults. Whenever your students need to read to complete projects or activities, highlight this for them, so they will become aware of the important role that reading plays in the transportation trades.

Activity:	Every time your students work on the Skilled Trades Centre's car or the engine assemblies they will need to read technical information explaining the steps for removing a component or part, or carrying out a procedure such as changing oil. Students will also need to read instructions, safety warnings on product labels, and material safety data sheets to complete certain projects and activities. Additional reading activities you to consider might include: Approaching a service station or dealership and asking them if they could supply you with a few examples of typical e-mails and work orders to share with your students. You could provide copies to your students and spend a few minutes in class reviewing how these documents are organized and how easy it is to determine what type of service or repair is being completed. Asking students to find a manufacturer's recall report on the Internet that they can bring to class for a brief discussion. Whenever possible, try to connect the issue being outlined in the documents you are discussing with the Skilled Trades Centre's car or engine assemblies. For instance, if a recall report mentions that a certain vehicle has a defective fuel pump, make removing the fuel pump from the car part of the activity to provide additional context. Ask your students to complete one or two of the automotive reading comprehension quizzes that are contained within Essential Skills Manual-Automotive Service Technician (NOC 7321), a publication produced by Human Resources and Skills Development Canada and the Apprenticeship Section of the PEI Department of Innovation and Advanced Learning. A link to a PDF of the complete publication is include directly below. http://www.nald.ca/library/learning/trade_essentials/auto_service_tech/auto_service_tech_esm/auto_services_tech_esm.pdf This publication focuses exclusively upon the role that essential skills play for Automotive Service Technicians, so all of the examples provided are from the automotive industry. You and your students will find a wealth of information in this guide that you can use in Transportation Trades 11.
#3	Using Documents
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades:

	Read safety symbols on movable parts. Fill out a variety of documents, such as job estimates, warranties, inspection reports, and accident forms. Study schematic diagrams for information on electrical, hydraulic, coolant and other systems. Use work orders to find information on vehicles to be serviced, such as repair need and descriptions of previous problems. Find automotive system faults by interpreting diagnostic graphs and integrating information from other sources. Whenever your students need to use documents to complete projects or activities, highlight this for them, so they will become aware of the important role that document use plays in the transportation trades.
Activity:	Every time your students work on the Skilled Trades Centre's car, the engine assemblies, or the trailer, they will potentially need to use documents. Ask you students to search the Internet and possibly approach a local service station or dealership to create a collection of the following documents that you can review in class: Job estimates Warranties Inspection reports Accident forms Schematic diagrams Diagnostic graphs You can also get your students to complete one or two of the document quizzes that are contained within Essential Skills Manual- Automotive Service Technician (NOC 7321), a publication produced by Human Resources and Skills Development Canada and the Apprenticeship Section of the PEI Department of Innovation and Advanced Learning. A link to a PDF of the complete publication is include directly below. http://www.nald.ca/library/learning/trade_essentials/auto_service_tech/auto_service_tech_esm/auto_services_tech_esm.pdf This publication focuses exclusively upon the role that essential skills play for Automotive Service Technicians, so all of the examples provided are from the automotive industry. You and your students will find a wealth of information in this guide that you can use in Transportation Trades 11.

#4	Developing Numeracy
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Measure tire pressure using a gauge. Monitor levels of oil, transmission fluid, brake fluid, and engine coolant. Calculate the total cost of repair jobs including parts, labour rates and taxes. Measure the tightness of bolts and fasteners with torque wrenches. Analyze electrical readings to identify faults, such as an engine that will not start. Estimate the useful life of remaining parts, such as tires, brake pads and exhaust systems. Measure mechanical parts, such as cylinder walls, brake discs and bearings using calipers, dial micrometers and plastiguage strips. Whenever your students use math to complete projects or activities, highlight this for them, so they will become aware of the important role that numeracy plays in the transportation trades.
Activity:	You can ask your students to measure tire pressure and check for levels of oil, transmission fluid, brake fluid, and engine coolant using the Skilled Trades Centre's car. You can also ask them to measure the tightness of bolts and fasteners with torque wrenches and measure mechanical parts such as cylinder walls, brake discs, and bearings using micrometers. You could also approach a garage service station, dealership, or parts recycler to see if you could obtain some tires and/ or brake pads that have varying degrees of wear. Your students could estimate and record the life remaining in each of these items using industry standards and procedures for tire and brake pad wear. You can also get your students to complete some of the math quizzes that are contained within Essential Skills Manual- Automotive Service Technician (NOC 7321), a publication produced by Human Resources and Skills Development Canada and the Apprenticeship Section of the PEI Department of Innovation and Advanced Learning. A link to a PDF of the complete publication is include directly below.

	http://www.nald.ca/library/learning/trade_essentials/auto_service_tech/auto_service_tech_esm/auto_services_tech_esm.pdf This publication has dozens of mathematical exercises covering all of the different mathematical topics that Automotive Service Technicians need to know. You may want to encourage students who are extremely interested in a potential career as an Automotive Service Technician to complete all of the quizzes provided to determine their overall strengths and weaknesses in math. You can ask your school's math teacher to help them with any mathematical weaknesses the quizzes identify.
#5	Writing
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Write brief notes on work orders describing repairs to customers' cars. Write brief e-mails or notes on web forums and technical support sites about unusual or difficult repairs. Write long letters for police and insurance investigations describing the causes and results of accidents. Whenever your students need to write to complete projects or activities, highlight this for them, so they will become aware of the important role that writing plays in the transportation trades.
Activity:	You can ask your students to write notes documenting all of the work they are completing on the Skilled Trades Centre's car, engines assemblies, and trailer. This will simulate what Automotive Service Technicians are actually requires to do on a daily basis. You may want to insist on a couple of occasions that students use their own words to write out all of the steps involved in a procedure such as changing one of the car's tires, or changing the car's oil. Learning to write technical descriptions and instructions can be very challenging, but Automotive Service Technicians who can perform this skills well make life easier for customers and colleagues who will rarely be confused about the service or repair that they working on.

#6	Communicating Orally
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Give instructions and guidance to shop helpers. Inform supervisors and customers if jobs are going to take longer than expected. Explain regular vehicle maintenance procedures to customers. Place orders for parts and supplies by telephone. Participate in discussion groups to share experiences, discuss problems and learn new methods of increasing productivity and providing customer service. Speak to customers and service advisors to obtain information about vehicle repairs. Respond to customer complaints regarding quality, cost or duration of repairs. Whenever your students need to communicate orally to complete projects or activities, highlight this for them, so they will become aware of the important role that oral communication plays in the transportation trades.
Activity:	You can ask students who have completed a procedure on the Skilled Trades Centre's car or engine assemblies to provide guidance to students who have not yet completed the procedure and need to learn how to do it. You can set up some brief role plays where students: Explain regular vehicle maintenance procedures to customers. Speak to customers and service advisors to obtain information about vehicle repairs. Respond to customer complaints regarding quality, cost or duration of repairs. You can get as detailed as you want with these potential role plays. Your main goal needs to be to get your students communicating and responding to, and dealing with, realistic scenarios.

	You may want to build your role plays around work you are doing on the cars and engines. For instance, if some of your students are performing a procedure on the car, you can pretend to be the customer and get them to explain what they are doing in simple, understandable terms.
#7	Working with Others
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Work well independently. Assist others as required. Whenever your students need to work with fellow students to complete projects or activities, highlight this for them, so they will become aware of the important role that working with others plays in the transportation trades.
Activity:	Students will be working in groups to complete all of Transportation Trades 11's projects and activities. Monitor your groups closely throughout Transportation Trades 11 and constantly provide groups with praise when they are working well together and discuss conflicts and help students resolve their difficulties when things are not going well.
#8	Thinking
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Decide whether to reorder parts or contact alternate suppliers when the parts needed for repairs are not available. Decide which tools to use, procedures to follow and tests to perform in order to diagnose and repair vehicles. Find information on stickers, labels, assembly drawings and repair manuals to determine the proper use, application and installation of parts and supplies. Decide to replace worn parts when repairs are not feasible or economical. Assess the condition of critical parts and systems, such as brakes, tires and exhaust systems.

	Interpret displays on computerized scanning equipment and onboard vehicle sensors to find operational information. Determine the reliability of information received from customers and its relevance to repairs. Decide on the most efficient course of action to complete various jobs. Evaluate the complexity of jobs to determine if they can be successfully completed. Whenever your students need to think to complete projects or activities, highlight this for them, so they will become aware of the important role that thinking plays in the transportation trades.
Activity:	Throughout Transportation Trades 11 your students will be challenged to think about the tools that they need to use, the procedures they must follow, and the most efficient course of action to follow when working on the Skilled Trades Centre's car and engine assemblies. Your job will be to ask them to reflect in their Learning Journals upon the thinking they needed to do as they complete projects, tasks, and activities within the Skilled Trades Centre. By the end of Transportation Trades 11 your students, if they work at it, will have developed some insight into some of the key thought processes that Automotive Service Technicians and other journeypersons in the automotive trades need to succeed at their jobs.
#9	Using Computers
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Use the Internet to gather information, such as technical service bulletins and recall notices. Use databases for activities such as reviewing past service information or to complete work orders. Use communications software for activities such as exchanging emails with other technicians or manufacturer support specialists. Use computer applications and computerized machinery such as diagnostic scanners and wheel alignment machines.

	Whenever your students need to use a computer to complete projects or activities, highlight this for them, so they will become aware of the important role that computer use plays in the transportation trades.
Activity:	Your students will be using computers at various time throughout Transportation Trades 11. Whenever they do, take a few minutes to highlight this and mention some other examples of how computers are becoming more prevalent within the Transportation Trades. When you take your students on tours of repair garages and service stations be sure to highlight all of the instances where computers are being used.
#10	Learning Continuously
Background:	Human Resources and Skills Development Canada reports that Automotive Service Technicians and other journey persons in the transportation trades: Learn about the latest technology on the job, in organized information sessions and in work discussion groups. Read work-related magazines, periodicals and automotive websites. Whenever your students need to need to learn or do something new to complete projects or activities, highlight this for them, so they will become aware of the important role that continuous learning plays in the transportation trades.
Activity:	You can get all of the students in your class to pause at just about any point during Transportation Trades 11 to draw attention to the fact that the kind learning they are doing will never stop of they decide to become a journeyperson within the automotive trades.

Trades Exploration

#1	Exploring Transportation Trades
Background:	There is not enough time in Transportation Trades 11 for students to experience all of the potential trades that are available within the automotive sector. You need to set aside time every week or two to highlight some of the other transportation trades.
Activity:	You can ask your students to research and provide brief presentations about the following trades: Automotive painter Motorcycle mechanic

	Motor vehicle body repairer Partsperson Recreation vehicle service technician Truck & transport mechanic Transport trailer technician You and your students may have other trades that you would like to add to this lists.
#2	Going Beyond Cars and Trucks: Other Motive Trades
Background:	Many other trades provide opportunities for working with engines. Your students may be interested in learning about opportunities to work in the aerospace, marine, rail, and heavy equipment sector. There are skilled journeyperson working in all of these sectors and tremendous opportunities available.
Activity:	You can ask your students to research and provide brief presentations about career opportunities in other three other prominent transportation trades: Aerospace Marine Rail You and your students may have other trades that you would like to add to this list.

Transportation Trades 11 Rubric

Introduction

Transportation Trades 11 can be a challenging course from an assessment perspective. Students rarely complete any projects that involve producing tangible products or structures that remain for you to observe and evaluate after class is over. Your only real opportunities for assessment are watching your students perform in class everyday. In many ways, you are like a supervisor or a boss with sixteen employees working in a service centre or dealership who is responsible for providing these employees with daily feedback to support their ongoing development (assessment for learning) and also responsible for providing an over-all performance appraisal at the end of every year (assessment of learning).

The Transportation Trades 11 Rubric has been designed to help you assess and monitor the performance of all of your students throughout the course. Its nine assessment areas include Safety, Measurement & Calculation, Tools & Materials, Document Use & Reading Text, Oral & Written Communication, Problem solving, Job Task Planning & Organizing, Working with Others, and Employability Skills & Attitude.

Student performance within the rubric is defined across three levels of performance for each assessment area. A deliberate choice has been made to not label Level 1 as "poor" or "fair" as with little experience within the automotive trades, most students will be expected to begin their learning journey at this level. Your goal throughout the course will be to use the rubric encourage students to work hard and to raise their level or performance in as many categories as they possibly can. Some students may attain Level 3 in every category while others may only attain Level 2 in some categories. Everyone learns at different rates and Transportation Trades is ultimately not about preparing students to immediately become skilled, fully capable transportation trades journeypersons. Most transportation trades take 2 to 4 years to become certified in, so in 110 course hours you are really only going to be able to assess whether a student is engaged in the automotive tasks and projects being completed, and working hard and doing their best to improve.

The Rubric

Transportation Trades 11 Rubric			
Level	3	2	1
Safety	Student is extremely well versed in workplace health and safety practices and never misses any potential hazards when performing Job Safety Analysis (JSA) for a task of procedure. Student never needs to be reminded about safety concerns and frequently reminds other students of safe work practices if required. Student never fails to wear the appropriate PPE for whatever task they are completing and knows exactly how to use.	Student is aware of workplace health and safety practices and can identify most potential hazards when performing Job Safety Analysis (JSA). Student needs very few reminders about safety concerns and can, for the most part, work safely with minimal supervision. Student almost always has appropriate PPE for the task at hand.	Student has some awareness of workplace health and safety practices and knows about Job Safety Analysis (JSA) but fails to indentify some potential hazards when analyzing procedures and tasks. Student needs to occasionally be reminded about safety concerns but responds well and works safely with constant supervision. Student usually has the appropriate PPE required for a given task but sometimes forgets or needs to be reminded to use it in the proper manner.

Level	3	2	1
Document Use & Reading Text	Student does a thorough job or reading engine and vehicle documentation and almost always comprehends the information presented and has few if any difficulties carrying out the instruction and the steps presented. Student constantly refers to engine and vehicle documentation when a potential issue occurs and because of their disciplined approach rarely encounters any difficulties that cannot quickly be resolved.	Student does a good job of reading vehicle and engine documentation carefully but still struggles sometime to comprehend the information presented and can occasionally overlook or misread some key instruction that results in problems and difficulties. Student willingly goes back to pore over engine and vehicle information when problems occur and keeps digging until a solution is found.	Student reads vehicle and engine documentation in a very cursory manner and frequently overlooks critical information. Student only has some elements of a task straight in their head when beginning to work on a vehicle or engine. Student will quickly go back to review engine or vehicle documentation again but in the same cursory manner as they initially did so problems encountered are often not resolved.

Level	3	2	1
Oral and Written Communication	Student never fails to make whatever daily entries are required to their Learning Journal and takes time to reflect upon the work that they are doing; all entries are accurate and concise and it is abundantly clear that the student is completely immersed in the learning process. Student takes pride in their communication and has succeeded at becoming a highly effective, capable communicator. Student is a confident, polished, professional communicator ready to work within a service centre, dealership or other industry environment.	Student makes thoughtful, reflective entries to their Learning Journal almost everyday, which demonstrate they are actively engaged in the course and committed to the learning process. Student takes definite pride in their communication and shows clear evidence of consistently working to improve their communication capabilities throughout the course. Student communicates reasonably well orally and cares about getting their message across but needs to develop more confidence and to become a bit more polished and professional.	Student makes regular entries to their Learning Journal but they appear to be quickly dashed of and demonstrate very little thought or reflection upon the task or topic to which they apply. Student takes some pride in their written communication but not enough to make meaningful improvement as the course proceeds. Student has trouble communication orally and is often misunderstood but is frustrated by this and put some effort into doing a better job of getting their message across.

Level	3	2	1
Problem Solving	Student is an excellent problem solver who exhibits "pit bull" qualities whenever difficulties are encountered. Student never under any circumstances gives up until a solution is found and always takes the lead when working with other students and team members to solve problems.	Student is a good problem solver who will usually work hard to find a solution and will only typically throw in the towel when a problem becomes extremely difficult to solve. Student does not rely upon other students to solve their problems but will work collaboratively with others and definitely want to be part of the solution.	Student sometimes attempts to solve problems but gives up easily if they cannot immediately find a solution. Student frequently looks to other students and team members to find solution but is supportive and encouraging of their efforts and will do whatever they can to help out if it does not require too much effort.

Level	3	2	1
Job Task Planning & Organizing	Student plans carefully and creates sketches, diagrams, plans, and a list of steps that need to be completed. Student has all tools, equipment, and materials required. Student completes the job task quickly and efficiently without needing to pause or fumble around to find anything. Parts and components are laid out and labeled very precisely so that there is never any doubt as to where everything goes and what is required. Job tasks are always completed quickly and efficiently because everything is planned and organized so well.	Student reviews the job task carefully and makes a few quick notes, which include most of the steps required to complete the work. Student usually has all of the tools, equipment, and PPE required to complete the job but sometimes has to stop in the middle of the task to search for a tool that they have forgotten or to find a tool better suited to the task. Most parts, components, and materials are organized but not as precisely as they could be, which occasionally hinders the student's ability to complete the task as quickly as they could if everything were organized more precisely.	Student thinks about the job task for a few minutes and has a rough plan in their head but they typically overlook some key steps and are not as prepared as they need to be. Student rarely has all of the tools, equipment, and PPE that they need to complete the job. Parts, components, and materials are somewhat organized but not well enough to allow the students to work quickly and efficiently.

Level	3	2	1
Working with Others	Students works extremely well with others and rarely, if ever, needs any help resolving any conflicts that occasionally might arise. Student takes full and complete responsibility for his or her actions and makes whatever sacrifices are necessary for the group to succeed.	Student generally gets along well with other students and team members with only the occasional conflict or issue that needs to be dealt with. Student does a reasonably good job of taking responsibility for their actions and for the most part requires very little supervision and encouragement to be a productive group member.	Student has some difficulties getting along with others but things can be worked out and managed with considerable supervision, negotiation, and discussion. Student can sometimes take responsibility for his or her actions but still needs to work on being a better team player who does not require as much supervision.

Level	3	2	1
Measurement & Calculation	Student makes precise measurements and correctly calculates area, mass, and volume almost 100% of the time. Student can move quickly back and forth between systems of measurement and can quickly make any conversions that are required. Student is highly proficient at using measuring tools such as the Vernier caliper and always produces accurate results.	Student makes precise measurements most of the time and correctly calculate area, mass, and volume most of the time. Student has very few problems converting between systems of measurement and even under pressure very rarely make errors. Student is proficient at using measuring tools such as the Vernier caliper and almost always produces accurate results.	Student can sometimes make precise measurements and can occasionally correctly calculate area, volume, and mass. Student can convert between systems of measurement but it is time consuming process for them and they sometimes make errors especially if there is pressure to complete a task quickly. Students know how to use measuring tools such as the Vernier caliper but sometimes make errors that produce inaccurate results.

Level	3	2	1
Tools & Materials	Student always chooses the right tool or materials for the job. Student never applies too much force when using a tool, or incorrectly applies materials, which leads to stripped fasteners and other damaged parts and components. Student can always describe the steps required to safely use a tool or a material.	Student usually selects the right tool or materials for the job. Student rarely applies too much force when using a tool, or incorrectly applies materials, which leads to stripped fasteners and other damaged parts and components. Student can usually describe the steps required to safely use a tool or a material.	Student sometime selects the right tool or materials for the job. Student sometimes applies too much force when using a tool, or incorrectly applies materials, which leads to stripped fasteners and other damaged parts and components. Student can sometimes describe the steps required to safely use a tool or a material.

Level	3	2	1
Employability Skills & Attitude	Student is always on time for class, properly dressed and ready to work. Student is never impolite or argumentative and always obeys instructions and abides by guidelines. Student is always honest. Student always demonstrates a good work ethic. Student always learns from mistakes and always accepts constructive criticism.	Student is usually on time for class, properly dressed, and ready to work. Student is rarely impolite or argumentative and almost always obeys instructions and abides by guidelines. Student is rarely dishonest. Student almost always demonstrate a good work ethic. Student usually learns from mistakes and usually accepts constructive criticism.	Student is sometimes late for class and not properly dressed and ready to work. Student is sometimes impolite or argumentative, and often does not obey instructions and abide by guidelines. Student is sometimes dishonest. Student occasionally demonstrates a good work ethic. Student sometimes learns from mistakes and occasionally accepts constructive criticism.

A Helpful Publication

An excellent publication that you may want to consider drawing upon as part of your assessment efforts in Transportation Trades 11 is Essential Skills Manual-Automotive Service Technician (NOC 7321). This publication is one of thirteen publications that make up a series called Trade Essentials, which is published by Human Resources and Skills Development Canada (HRSDC) in partnership with the Apprenticeship Section of the PEI Department of innovation and Advanced Learning. Besides the manual for Automotive Service Technicians, there are twelve other manuals for the following trades that you may find useful:

Cabinet Maker	Carpenter	Construction Electrician
Cook	Industrial Electrician	Machinist
Metal Fabricator	Oil Burner Mechanic	Plumber
Steamfitter/Pipefitter	Welder	Refrigeration/Air Conditioning Mechanic

You can use this manual with your students to indentify their strengths and weaknesses in the following essential skills: reading text, document use, numeracy, oral communication, writing and using computers. The manual focuses upon Automotive Service Technicians so all of the tests, quizzes, and examples are exclusively from the automotive industry.

You can access a PDF of this manual online at the following URL:

http://www.nald.ca/library/learning/trade_essentials/auto_service_tech/auto_service_tech_esm/auto_services_tech_esm.pdf