

TMJ4C

MANUFACTURING

The Hammer

[Abstract](#)

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Project Overview

In TMJ3C, students develop knowledge and skills through hands-on project-based learning. This project allows students to develop design, fabrication and problem solving skills while learning manufacturing techniques using tools and equipment such as lathes, mills, drill presses and various hand tools. This project is student centred in that there is flexibility to accommodate and serve to each individual's strengths, abilities and/or IEPs. The skills learned herein can be applied to other projects throughout the course. The focus is on student understanding and learning of the process of manufacturing a product.


Project Challenge

In Manufacturing Technology, students learn and acquire skills on machinery such as lathes, milling machines, drill presses and various hand tools. The Hammer project will allow students to conduct research and apply the design process to their project. Throughout the course of the project, they will communicate with the instructor as to what is the optimum process for student success. Technical drawings are prepared by the students and they will demonstrate a working knowledge of lay out, safe machine processes and correct manufacture of a product.

Connections

Ontario Curriculum
Manufacturing Technology
TMJ4C College preparation

Teacher Tip
Connect the goals of the TMJ4C course outlined in the Ontario curriculum with the project (pg.312)

Project Criteria	Examples
<ul style="list-style-type: none">- Process to be planned out before production- student will create a list of parts, components that are part of the project- Must be made of steel or aluminum- Must have a working set of drawings: Either student designed or provided sample- student must use the lathe, milling machine, drill press and various hand tools.- students will present their completed project and an understanding of the process through an engineering report and/or interview process.- student will show evidence of collaboration with peers	 <p>The 'Examples' column contains three photographs of custom-made metal tools. The top image shows a hammer with a long, thin metal handle and a flat, rectangular metal head. The middle image shows a pickaxe with a long, thin metal handle and a double-pointed metal head. The bottom image shows a T-handle screwdriver with a long, thin metal handle and a T-shaped metal head. All tools appear to be made of steel or aluminum.</p>

Project Synopsis and Timelines

Act #	Activity Title/Name	Time (hrs.)	Curriculum Expectations	Assessment & Evaluation	Connections?
1	Research and Discussion <ul style="list-style-type: none"> - Use of websites - Safety review - Basic design - Review of Group work - Brainstorm activity 	2	A1, B1 A1.1 A1.3, A1.4 B1.1 B1.2	-K/U -T -C	<ul style="list-style-type: none"> ▪ Ontario Curriculum ▪ Growing Success ▪ DI ▪ SEF ▪ STEM ▪ Literacy ▪ Ontario Skills passport ▪ ICE ▪ FNMI First Nations, Metis
2	Project Development <ul style="list-style-type: none"> - Apply Process plan - Cut/Lay out: Head Machine - Turn Handle - Finish / polish 	15	A2, A4 A2.2, A4.1, A4.2 B2,B4 B2.1,B2.3,B3.2 B4.3	-K/U -T -C -A	<ul style="list-style-type: none"> ▪ Ontario Curriculum ▪ Growing Success ▪ DI ▪ SEF ▪ STEM ▪ Math Success ▪ Equity Inclusive... ▪ Ontario Skills Passport ▪ Octe Safelab/Safetynet ▪ ICE
3	Project report / Interview <ul style="list-style-type: none"> - Engineering report - Interview on process and 	3	A1.1,1.2,2.4.4.4.7,4.8 B1.1,1.4,2.1 C2.3,2.4,D2.3,2.4,2.5,2.6	-K/U -T -C -A	<ul style="list-style-type: none"> ▪ Ontario Curriculum ▪ Growing Success ▪ SEF ▪ STEM ▪ Literacy ▪ Math Success ▪ Equity Inclusive... ▪ FNMI First Nations, Metis

CONNECTIONS RESOURCE LIST

1	The Ontario Curriculum, Grade 11-12, Revised 2009	http://www.edu.gov.on.ca/eng/curriculum/secondary/2009teched1112curr.pdf
2	2 Growing Success	http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf
3	student Success: Differentiated Instructions Educator's Package, 2010(DI)	http://www.edugains.ca/resources/DI/EducatorsPackages/DIEducatorsPackage2010/2010EducatorsGuide.pdf
4	School Effectiveness Framework	2013 (SEF) http://www.edu.gov.on.ca/eng/literacynumeracy/SEF2013.pdf
5	Think Literacy	http://www.edu.gov.on.ca/eng/studentssuccess/thinkliteracy/
6	Leading Math Success	http://www.edu.gov.on.ca/eng/document/reports/numeracy/numeracyreport.pdf
7	Ontario First Nations, Metis, and Inuit Education Policy Framework (FNMI)	http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf
8	Ontario's Equity and Inclusive Education Strategy	http://www.edu.gov.on.ca/eng/policyfunding/equity.pdf
9	Ontario Skills Passport (OSP)	http://www.skills.edu.gov.on.ca/OSP2Web/EDU/DisplayEssentialSkills.xhtml
10	OCTE Resources: SafeDocs, SafetyNet, Emphasis Courses	http://www.octelab.com/
11	Learning for All, Universal Design and Differentiated Instruction	http://www.edu.gov.on.ca/eng/general/elemsec/speced/LearningforAll2013.pdf

Activity 1 - Research and Discussion

Minds On (Engaging Prior Knowledge)

Activity 1 Project Research and Information Gathering

Activity Description:

The technological classroom is a major proponent of Project Based Learning. This project is flexible and can be adjusted to a student's individual strength by allowing the student to decide on a design of their choice and level of ability. The Hammer project allows students to experience the manufacturing process, collaborate with others and develop skills that can be used throughout the course. During the design process there will be project research and gathering of information. students will work closely with their peers and their instructor.

Activity 1 Criteria and Instructions

Research

- student will collaborate and research the material to be used and its properties (machinability of steel)
- Use online resources to develop the project design: websites, catalogues, an actual hammer
- Tie in the research to a rough process plan (this may affect the design)

Design

- Complete a sketch(es) with dimensions that could be used as a working drawing
- Consideration should be given to personalize the hammer (stamp or unique feature)
- Compile the information gathered (including drawings) that will be used in the engineering report

Activity 1 Prior Knowledge

Connections

<ul style="list-style-type: none"> - Collaboration and group skills: working with peers, communicating with instructor on review of prior knowledge - Understanding of a safe, open learning environment and how to have respect for others, machinery and yourself - Research skills using online resources, books , magazines - Technology based skills: Word, Google Docs/Classroom - Engineering or Technical report writing based on TMJ3C course expectations - Basic understanding of Technical drawings as per TMJ3C - Understanding of Safety rules and regulations and how they relate to the design process and part production - Understanding of a safe, open learning environment and how to have respect for others, machinery and yourself 	<p>SEF Component Indicator 2.1: <i>“...a collaborative learning culture is evident...”</i></p> <p>SEF Component Indicator 2.5 : School and Classroom Leadership: <i>“Classroom practice reflects safe, accepting, inclusive, caring, respectful and healthy learning environments..... The learning environment supports the diversity of learners...”</i></p> <p>Teacher Tip Review all expectations of a collaborative working environment and safety rules. Have students mindstorm their previous knowledge of this information. Do a review of any technology (Googledoc / classroom/ Word) that the student may use.</p> <p>Ontario Curriculum student to draw from prior knowledge of these expectations and strands TMJ3C: B1.1, 1.4, 2.2,3.1,3.1,3.2,3.4,4.3</p>
<p>Activity 1 Planning Notes</p>	<p>Connections</p>
<ul style="list-style-type: none"> - Plan on using either: Computer workstation (booking computer labs/ technological resources) and/or Google Docs/classroom (make sure access codes are current and a primer is planned on how to access or use the technology) - Prepare a “ Safety Rules “ primer session, listing all the safety expectations (this will be reviewed throughout the course) - Always check for Wifi stability or interruptions 	<p>Teacher Tip Accessing information electronically is efficient and easy for both the student and the Teacher and allows for use of personal devices. Always have a backup plan in case the Wifi is unavailable, such as referring back to a brainstorming research discussion and have the students compile a list of Safety Rules.</p>

Action (Introduce or Extend Learning)

Activity 1 Instructional Strategies	Connections
<p>Teacher</p> <ul style="list-style-type: none"> - Establish collaborative working groups (2- 3 maximum) - Discuss overall and specific expectations and how it relates to the assessment/evaluation - Discuss accommodations with students per their IEP - Explain the purpose of the project and why process is the key (explain that the skills developed will be used later in the course and relate this to the philosophy of broad-based technological education) - Show exemplars for Activity 1: Process plan, drawings , indication of group work - Explain rubric that will be the exit card to next activity - Discuss the role of the First Nations in the development of the Steel Industry: Many First Nation members were hired by steel companies for rigging , welding and steel work at heights. They are legendary in their roles during the development of steel structures. <p>student</p> <ul style="list-style-type: none"> - With your instructor, establish a working group that you can discuss process plans, approach to the drawing and what materials you will use - Use the resources for brainstorming, pros/cons and material selection chart provided by your teacher. - Record and keep evidence of the resource you used and collaborative efforts and discussions that will be included in your final engineering report - ICE activity : using PEDs, research our Ministry website about the SHSM programs and its relevance to our course and project. Brainstorm with your peers as to how you can incorporate this information in your final report. 	<p>Sef Component 1 Assessment for, as and of learning</p> <p>Growing Success Achievement charts pgs. 24-25, Part 4 : Assessment for / as learning Explanation of what the expectations are and how to get there</p> <p>Think Literacy Brainstorming guidelines pg. 22 Pro / Con chart pg. 37 Material selection Chart pg. 38</p> <p>FNMI Show examples of the relationship between the manufacturing industry and the effect on Aboriginal land</p> <p>Teacher Tip Do the research and be prepared to initiate a question and answer discussion on the relationship between progress and The Aboriginal community: What is the benefit ? What is the loss ?</p> <p>Ontario Curriculum Philosophy of broad based education, pgs. 7-8</p> <p>Ontario Skills Passport Essential skills learned that are transferable Pgs. 33- 34</p> <p>Teacher Tip Connect and use these resources listed above to the teacher instructional strategies on the left</p> <p>ICE (Teacher Tip) During the research and design stage, students should be</p>

	<p>connected to the idea of the entrepreneurial link in the preparation of this project. SHSM leaders can visit the class and discuss the links and transferable skills</p>
<p>Activity 1 Assessment and Evaluation</p>	<p>Connections</p>
<p>Assessment and evaluation for this activity will be ongoing during the duration of this initial component of the project. The teacher will use professional observation notes created during conferencing with the students and their group as well as a check brick.</p> <p>Knowledge and Understanding</p> <ul style="list-style-type: none"> - students prior knowledge and understanding on technical drawing and process planning from TMJ3C will be assessed and noted through daily conferencing with the student - Descriptive feedback will be ongoing in order to improve students progress <p>Thinking</p> <ul style="list-style-type: none"> - Assessing the student’s critical thinking and problem solving skills will be based on professional observation and conferencing logs <p>Communication</p> <ul style="list-style-type: none"> - The initial data (drawing, process plan and collaboration notes) will be assessed as part of the engineering report. 	<p>Growing Success Assessment categories, Professional observation (pg.39) Triangulation of evidence: <i>Observations, conversations and student products</i></p> <p>Sef Indicator 1.4 Learning goals and success criteria are used consistently to scaffold student learning, provide descriptive feedback and set high expectations for students</p> <p>Teacher Tip When conferencing with the student, report it directly in a notebook, comment section in Markbook or Google Classroom. Remember to provide feedback to the student.</p>
<p>Activity 1 Accommodations</p>	<p>Connections</p>
<p>Teachers will be familiar with exceptional students’ Individual Education Plans (IEPs) for legislated accommodations and consult with the appropriate staff, such as a conference with the student, parent, counsellor and Special Education department. After the conferencing, teachers can implement prescribed modifications and accommodations. Teaching Strategies for students with special needs may include but not be limited to:</p> <ul style="list-style-type: none"> - Creating heterogenous groups to foster peer support and help for students in need - Using “ chunking “ strategies or breaking down info to small bits 	<p>Sef Indicator 1.5 students are taught to monitor their own progress and use self assessment strategies in order to understand the type of learner they are</p> <p>2010 Differentiated Instruction Educator's guide Knowing the learner (pg. 10) Learning style preferences (pg. 14)</p> <p>Teacher Tip</p>

<ul style="list-style-type: none"> - Using self assessment strategies during the activity - Accommodating/modifying the project to allow for student success example: allowing extra time to complete a part - Using various forms of differentiated instruction : Mind maps,word lists, flipped classroom strategies, one on one conferencing, using a scribe. 	<p>The unit planner in the differentiated instruction educator's guide on page 24 will be very helpful for activity 1 ,2 and 3.</p>
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Consolidation & Connections (Provide Opportunities for Reflection)

Activity 1 Reflection Paper/Exit Card	Connections
<p>Conference / Interview check brick : Appendix A</p> <p>The teacher will evaluate student work with use of a check brick that isolates “ look fors “. The check brick assesses what the student used to gather information (pros//cons lists, material / cut lists) for the project and whether a technical drawing was created. Additionally, the teacher will be looking for evidence of collaboration.</p>	<p>Differentiated Instruction students working on the same curriculum expectations in various ways with common criteria for success (pg. 4) . Use the interview / check brick as an exit card to develop instructional routines and skills (pg. 6)</p>

Materials, Tools and Resources

Activity 1 Materials and Tools

Drawing samples

Project exemplar

Measuring tools: Callipers, micrometers, height gauges, steel rule

Conventional drafting equipment: Compass, ruled sheet, protractor

Grid paper

Activity 1 Websites

<https://www.marsdd.com/mars-library/k-12-education-opportunities-and-strategies-for-ontario-entrepreneurs/>

Google Classroom

<https://classroom.google.com>

Youtube

<https://www.youtube.com>

OCTE Safe docs

<http://www.octe.on.ca>

Ontario Skills Passport

<http://www.skills.edu.gov.on.ca/OSP2Web/EDU/Welcome.xhtml>

<http://www.practicalmachinist.com>

Activity 1 Publications

Ontario skills Passport

School Effectiveness Framework

Differentiated Instruction Educator's Guide

Growing Success

The Ontario Curriculum: Grades 11 and 12 , Technological Education

Think Literacy

Technology of Machine Tools, S. Krar

Activity 1 Computer Software

Markbook

CAD software (if available)

Internet availability

Activity 1 Human Resources

Visiting members of Industry
Teaching Assistant
SHSM leaders (if applicable)
OYAP representatives
Guidance Counsellors (visit for course selection)

Activity 1 Other

Visiting Alumni (Graduates in workplace, apprenticeship and Post Secondary studies)
Community members
In School Teachers of other courses (possible counselling or dual teaching leading to interdisciplinary course development)

Activity 1 Appendices

Interview “ look for “ checklist / check brick: Appendix A

Activity 2 - Name of Activity

Minds On (Engaging Prior Knowledge)

Activity 2 Project Research and Information Gathering

Activity Description:

Students will now apply their Process plan, create a cut list that will be used in the production of the hammer and begin to work on the machinery required. During the minds on portion of the activity, they will review safety rules specific to each process, lay out the parts where necessary and machine and use prior knowledge on how to perform the actual steps to manufacture the hammer.

Activity 2 Criteria and Instructions

Review of Safety

- Safety rules and regulations for shop operations and machine specific (Horizontal cutoff saw, lathe, milling machine, drill press, tap, die, file, sand paper, polishing)

Application of Process

- Apply the operations required to lay out and machine the project to the specifications detailed in the students information gathering during activity 1. Typical process will be listed in the Action section under Instructional Strategies

Activity 2 Prior Knowledge	Connections
<p>-The student is required to have a clear understanding of the safety rules in the shop environment and specifically to each machine , tool or operation.</p> <ul style="list-style-type: none"> - The student will review and use both basic and precision layout skills using a height gauge, Calliper, blueing ink and scribe in order to prep the components for machining - The student will use the skills developed in TMJ3C on the Horizontal cut off saw, Milling machine, Lathe and Drill press and bench/hand tools - The student will use information gathered in TMJ3C on how to properly use a threading die and tap, in order to successfully cut mating threads - The student and the teacher will review AND re-implement the collaborative skills, inclusive environment and safe classroom policies introduced in TMJ3C. 	<p>Ontario Curriculum student is to draw from prior TMJ3C curriculum strands and expectations: A1.1,1.2,1.3,2.2,2.4,4.1,4.4,4.5, 4.8</p> <p>SEF Indicator 1.4 “ learning goals and success criteria are used consistently to scaffold student learning, provide descriptive feedback and to identify next steps”</p> <p>Teacher Tip As per the SEF document, consider descriptive feedback as one of your ultimate tools in preparing the student for success</p>
Activity 2 Planning Notes	Connections
<ul style="list-style-type: none"> - Make sure each student has had a safety review and use a sign off sheet to comply with safety regulations (OCTE Safety Net and Safe Docs) 	OCTE Safety Lab

<ul style="list-style-type: none"> - Prep and check all PPE used for the class - Do a brief IEP primer prior to each class - Prep each machine and ensure that they are in safe operational order (check guards and Estops) - Prep and arrange the material that the students will use - Check all lay out equipment: Ensure height gauge is operational, supply of blue ink, sharp scribes - Prepare to review each students process plan and drawing 	<p>Refer to OCTE Safety lab for help in preparing and safety instruction</p> <p>Ontario Skills Passport Re-iterate the transferable skills</p> <p>DI Teacher Tips Teacher should plan a personal review of all IEPs in the classroom and plan to address and accommodate the students for this Activity.</p>
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Action (Introduce or Extend Learning)

Activity 2 Instructional Strategies	Connections
<p>This project has been developed to be flexible and support individual student skills and abilities. It is important that an understanding of the ability to demonstrate the process is stressed as a key expectation, and that the end product should conform as close as possible to the student's initial design. Teachers and students must follow Safety guidelines and keep records updated. Manufacturing Technology demands unique requirements to operate machinery safely and effectively. The teacher is encouraged to use Differentiated Instructional strategies in an ongoing basis to support success for all students.</p> <p>Teacher</p> <ul style="list-style-type: none"> - Confirm and record Safety data and track record of student safety tests and assessments prior to allowing student to use tools and machinery - Prepare accommodations and modifications where necessary as per IEPs, including assistive equipment such as wood boxes for height equity, ear protection for hearing sensitivity - Use demonstration techniques and follow up with daily reviews on safety features and techniques for each machine students will be using - Check that all student process plans are safe and will not pose harm to student or machinery - Consider using peer helpers and/or assign student shadowing - Share Markbook updates and use daily conferencing to give descriptive feedback to students for project success - Use "question and response" techniques - Consider explaining operations by analyzing in reverse order or reverse engineering - Shadow and "hover" by students during machine use 	<p>STEM /Teacher Tip Prior to the start of Activity 2, connect the relationship between STEM and the project. There are several areas to discuss. Most notable being the relationship to careers. Identify that the skills they are learning are transferable. A website that will help: http://www.thelearningpartnership.ca</p> <p>OCTE Safety Net / Safe Docs As part of the instructional strategies, review all safety information by using the OCTE Safety Net /Safe Doc resource.</p> <p>Teacher Tip Create groups to research safety point for each machine and operation using the OCTE Safedoc.</p> <p>Growing Success Assessment for learning via descriptive feedback using Markbook updates</p> <p>Equity</p>

- Consider teachable moments when errors have happened or the unexpected occurs (Example1: The lathe tailstock comes out of the thread. Stop the class and explain why and how to resolve the issue. Example 2: The saw blade comes off the pulleys on the horizontal cut off saw. Use the moment to discuss how the machine works, why it may have happened and the necessary steps to repair.)
- Promote and support safe and positive learning communities in the classroom. (Example:students can discuss with the class their “ Teachable “ moments)
- Assist students in record keeping and notation for the final engineering report (Example: Run “literacy check ups” on punctuation, grammar, word usage and spelling for effective communication) Can be done via peer evaluation
- Consider having industry visitors to discuss careers and life planning via entrepreneurship

student (process plan and operations should roughly follow these steps-specific tolerances and sizes to be determined by student and Teacher as per individual process plan and drawing)

- Receive permission from instructor to begin work
- Keep record of operations(what happened ? what went right? what did not go well ?) and reflection notes for engineering report
- Cut off square stock material for the head of the hammer on the horizontal cut off saw and leave material to machine(refer to your drawing) and deburr after measuring
- Cut off round stock material for the handle. Allow material for machining (refer to your drawing) and deburr after measuring
- Lay out angle lines, centre line on hammer head for thread hole. Measure all lines
- Machine head of hammer to size on Milling machine (Measure dimensions)
- Machine the angle on the hammer-head (Measure dimensions)
- Centre drill and then drill Tap drill size for thread specified on drawing on drill press or milling machine
- Use appropriate thread tap and cut thread on head
- End face round stock, both ends (Measure!)
- OD turn one side of shaft, rough and finished dimension (Measure your result)
- OD turn other side and cut wall and thread diameter for external mating thread (Measure)
- Cut taper on top portion of handle (if required and measure taper length and degree)
- Cut Knurl on lower portion of handle (if required and measure length)
- Thread external thread on handle with proper matching die
- Thread on the head to the handle and using peen end of ball peen hammer, peen the threaded portion remaining.

It is a goal in our Educational approach to create a classroom environment that supports diversity and individual learning. Ontario’s Equity and Inclusive Strategy, (**pg. 14 -15**)we recognize that some students face barriers to learning. Use of resources such as the Think Literacy and Numeracy documents will aid in creating an inclusive and equitable learning community.

Leading Math Success :Numeracy

Valuing the students methods,using the student's understanding and making real world connections to mathematical problems is considered the “ Connectionist “ approach. A highly effective model of teaching orientation. (pg. 29 - 31)

ICE

Lead students to see the connection between the skills they are developing and how they are transferable to other careers. Have a visiting member of industry reflect on this.

Teacher Tips Technology of Machine Tools (Text / S. Krar)

A proper text may be useful for the student as an instructional strategy. The use of modelling and demonstration is ideal in certain situations but additionally connecting a problem or technique to a unit or section in a text can be an alternative explanation.

<ul style="list-style-type: none"> - Deburr, sand with varying grit sandpaper and polish the whole hammer to shine - Engrave or add stamp or feature to personalize the project - Compile and edit all your records of operations for the engineering report 	
<p>Activity 2 Assessment and Evaluation</p>	<p>Connections</p>
<p>The bulk of the assessment and evaluation in Activity 2 is in the Application and Knowledge categories. The process that the students use, their knowledge of the machinery and their Safe work habits all add to the final project mark. Below are the categories and criteria the teacher should address: (APPENDIX B:Rubric)</p> <p>Safety and Maintenance (Application) 10% Has the student applied all safety procedures effectively ? (did they leave a chuck key in the lathe chuck ? Were all guards in use? Was the student unprofessional in the shop ?</p> <p>Product and Work (Application) 25% This is the Product mark and the teacher should use criteria that reflects the feedback given to the student throughout the manufacture of the hammer. (Were all tolerances achieved ? Is the hammer sound, aesthetically pleasing? Does the finish and final form show a high degree of quality?)</p> <p>Operations knowledge and Tooling (Knowledge) 30% During the project, did the student demonstrate the knowledge required for a quality project ? (Did the student use the correct tools ? Has the student displayed knowledge in the setup for an operation ?)</p> <p>Process Planning (Thinking) 20% This is an analysis of the student's process plan for the project. Is there evidence of the student using critical thinking skills for the process plan? Has the student shown and ability to problem solve and react to a change required in their process plan ? Did the student follow their plan? Was it effective?</p> <p>Technical Drawings / Engineering Journal (Communication) 15% The technical drawings and shop logs for the project. The drawing and the data will be part of the students final report and the mark will be assessed here and attached to the final report mark as a part of the communication portion.</p>	<p>OC TE Safety Lab/ Teacher Tip The OC TE resource will be used as a metric for the safety and maintenance portion of activity 2</p> <p>Ontario Curriculum Evaluation based on these expectations and strands A2, A4 A2.2, A4.1, A 4.2 B2,B4 B2.1,B2.3,B3.2 B4.3</p>

<p>Activity 2 Accommodations</p>	<p>Connections</p>
<p>Teachers are to be familiar with exceptional students' Individual Education Plans (IEPs) for legislated accommodations and consult with the appropriate staff. By doing this, teachers will be aware of and can implement prescribed modifications and accommodations. Consulting with the Parents, Guidance and Special Education departments is important to elevate opportunities for student success. Some considerations during Activity 2:</p> <ul style="list-style-type: none"> - Allow for extra time for the student to complete - The student may need other forms of instruction (modeling and assistance, peer help, chunking, slower and clearer explanations) - Group students with an experienced peer - Use question / answer drills when students are problem solving - Illustrate techniques with drawings / sketches - Use peers to explain in a teachable moment 	<p>Growing Success (pg. 70)</p> <p>Refer to the policy regarding students with special educational needs: Modification, accommodations, and alternative programs</p> <p>“ A student's Individual Education Plan (IEP) describes their educational program and any accommodations that may be required. The IEP specifies whether the student requires:</p> <ul style="list-style-type: none"> - Accommodations only:or - Modified learning expectations, with the possibility of accommodations:or - An alternative program, not derived from the curriculum expectations for a subject/grade or a course <p>DI / TEACHER TIPS</p> <p>The use of accommodations for certain IEPs can also inspire the teacher to try techniques that are similar, regularly with every student, such as chunking or breaking down the information into smaller bits of information.</p>

Consolidation & Connections (Provide Opportunities for Reflection)

Activity 2 Reflection Paper/Exit Card	Connections
<p>Engineering Journal/ Shop Notes / Project completion The student will have their engineering journal, shop notes and project, peer reviewed and discussed with the teacher prior to moving onto activity 3. This collaborative approach will position the student for success heading into the report phase of the project.</p>	<p>Teacher Tip Peer reviewing is an extension of creating a safe, inclusive learning community and supports collaborative learning skills.</p>

Materials, Tools and Resources

Activity 2 Materials and Tools
<p>Steel (square and round stock) Aluminum (square and round stock) Lay out equipment: Scribes, height gauge, callipers, v blocks, blue ink Hand tools and shop resources: Hacksaw, files, deburring tool, sandpaper, 90 degree angle polisher, taps, dies, bench vise, coolant, threading fluid, oil, varsol Horizontal Cut Off Saw Milling Machine Drill Press Lathe</p>
Activity 2 Websites
<p>Google Classroom https://classroom.google.com Youtube https://www.youtube.com OCTE Safe docs http://www.octe.on.ca</p>

Ontario Skills Passport
<http://www.skills.edu.gov.on.ca/OSP2Web/EDU/Welcome.xhtml>
<http://www.practicalmachinist.com>

Activity 2 Publications

Ontario skills Passport
School Effectiveness Framework
Differentiated Instruction Educator's Guide
Growing Success
The Ontario Curriculum: Grades 11 and 12 , Technological Education
Think Literacy
Technology of Machine Tools, S. Krar
The Machinery Handbook, Industrial Press
The New American Machinists Handbook, McGraw Hill

Activity 2 Computer Software

Markbook
CAD software (if available)

Activity 2 Human Resources

Visiting members of Industry
Teaching Assistant
SHSM leaders (if applicable)
OYAP representatives
Guidance Counsellors (visit for course selection)

Activity 2 Other

Visiting Alumni (Graduates in workplace, apprenticeship and Post Secondary studies)
Community members
In School Teachers of other courses (possible counselling or dual teaching leading to interdisciplinary course development)

Activity 2 Appendices

Project Evaluation Rubric: Appendix B

Activity 3 - Name of Activity

Minds On (Engaging Prior Knowledge)

Activity 3 Project Research and Information Gathering

Activity Description:

Activity 3 is comprised of consolidating all the information gathered during activity 1 and 2 (research notes, collaborative anecdotes, drawings, journal entries, calculations) and compiling it into an Engineering report and/or using an interview with the teacher to help clarify your information. In Technological studies and industry, students will need to write technical reports, proposals, scientific papers, and electronic messages. Writing and conversing is an effective way to convey your ideas to managers, other engineers, and customers. Communication skills will determine how successful students become in their particular field.

Activity 3 Criteria and Instructions

The Engineering report (roughly 6 - 8 pages) will include:

- Title Page with photograph of your project
- Summary
- Table of contents
- Introduction
- Middle section with numbered headings
- Conclusion
- References
- Appendix
- Section (paragraph) anywhere in the report addressing and identifying the relationship between the manufacturing industry and the First Nations

If the student or teacher chooses to request an interview, the documentation for the report must be handed in, as the interview is to allow the student another method to convey their understanding of concepts in context of the project.

<h3>Activity 3 Prior Knowledge</h3>	<h3>Connections</h3>
<p>The student’s success in demonstrating a clear and concise Engineering report will rely on recalling prior knowledge. The terminology and conventions used in professional technical dialogue are the “look fors” in the report, in addition to other ideas and concepts expressed in the rubric. In summary, the student should be familiar with:</p> <ul style="list-style-type: none"> - Proper Technical terminology - Clear identification of, and ability to explain Machine operations - Correct usage of appendices , references, footnotes - Understanding of vocabulary, grammar rules, sentences and structure that is unique and applicable to the student - Strong ability to incorporate charts, drawings , sketches and symbols as a way to express concepts - First Nations and the steel industry 	<p>Ontario Curriculum</p> <p>The student is to draw prior knowledge from TMJ3C curriculum: A1.1,1.21.3,2.1,2.2,2.3,2.4,4.7,4.8, C1.1,1.5,2.2,2.3,D1.1,2.3,2.4,2.7</p> <p>Teacher Tip</p> <p>Collaboration with other departments that are relevant to this section of the project is valuable and can make a strong connection to the student. Suggest discussing this portion of the project with the student’s English teacher in order to help with rules and conventions.</p>
<h3>Activity 3 Planning Notes</h3>	<h3>Connections</h3>
<ul style="list-style-type: none"> - Have clear explanations and more than one example for each section in the report - Have an exemplar ready, both hard copy and electronic - Have references from the Think Literacy document ready - Make sure WiFi and computer labs are available - Prepare IEP list and accommodation plans (if necessary) - Research and prepare discussion on the First Nations and the relationship with the steel industry 	<p>Sef Indicator 1.5</p> <p><i>“..Use work samples to help them understand what quality work looks like and to develop or refine their understanding of success criteria....”</i></p> <p>Teacher Tip :FNMI</p> <p>Use all resources available and dedicate a session on discussing the steel industry and the relationship with the First Nations: http://www.ictinc.ca/kahnawake-skywalkers-a-brief-history-of-mohawk-steel-workers</p>

Action (Introduce or Extend Learning)

Activity 3 Instructional Strategies	Connections
<p>This project is intended to be flexible and support individual student skills and abilities. It is important that the teacher has an understanding of the abilities of the student and their level of learning that go beyond the technology classroom.</p> <p>Teacher</p> <ul style="list-style-type: none"> - Use work samples to discuss and note, (electronically through Google Classroom or on a markerboard or chalkboard) the expectations and goals for student Success - Encourage group work - Assign Peer helpers that are higher level learners (heterogenous groups) - As a group, read through the exemplar and discuss - Daily conferencing to make sure the student is taking effective notes during instructional portions - Consider having Teachers from other departments as guests for brief co-teaching sessions - Assist in writing the section on the First Nations - Review, log and check their work daily - Review requirements of rubric: Grammar/Math is sound. <p>students</p> <ul style="list-style-type: none"> - Create work groups daily - Seek out opinions, advice and help from peers - Analyze each section of the report until you are aware of what is expected in those sections - Have a review day where you can compare your notes with other students and discuss strategies to improve your report - Use the learning lab in your school for writing help - Advocate for and use your accommodations as per IEP - Try to make connections between this project and STEM 	<p>SEF Indicator 1.3 At all times, student success is a result of descriptive feedback and a clear understanding of the learning goals and success criteria.</p> <p>SEF Indicator 1.5 Use work samples or exemplars And review and discuss them daily</p> <p>SEF Indicator 4.2 (PG. 27) <i>“ A comprehensive literacy and numeracy focus supports student achievement through use of the current Ontario curriculum and associated resource documents. “</i></p> <p>Teacher Tip Re-iterate each section of the report daily, using the exemplar and comparing it with the student’s, side by side. Use positive observations to illustrate differences or similarities</p> <p>FNMI The First Nations were greatly affected by the development of the steel industry , here and abroad. The expansion of various sectors such as the Railway affected Aboriginal land</p>

	<p>claims. Additionally, the steel industry greatly employed members of the Mohawk.</p> <p>STEM</p> <p>The focus on math and science in our classrooms is paramount. As stated in the MaRs document, K-12 Education: Opportunities and Strategies for Ontario Entrepreneurs(pg. 6), to remain globally competitive, we must focus on science, technology , engineering and math.</p>
<p>Activity 3 Assessment and Evaluation</p>	<p>Connections</p>
<p>The Rubric in Activity 3 is based on Rubrics described in the Growing Success document. Additionally, the option of using the interview with supporting documents is available to the students. (APPENDIX C:Rubric)</p> <p>Knowledge and Understanding (25%)</p> <p>The student shows understanding and knowledge of machining concepts, process and tooling :</p> <ul style="list-style-type: none"> - What is the correct tool to use for a certain operation ? - - Understands and can explain definition/use of speeds and feeds- - Does the student show understanding of process order ? example: Which side to turn first ? <p>Thinking (25%)</p> <p>The student's report displays creative critical thinking skills, planning and processing.</p> <ul style="list-style-type: none"> - The report is laid out properly, according to the sequence of the project and the machining operations - There is evidence of critical thinking skills in how the student discusses troubleshooting and/or discusses problems <p>Communication (25%)</p> <p>Correct and effective use of conventions, vocabulary, terminology in the Manufacturing Technology discipline</p> <ul style="list-style-type: none"> - Does the student use correct terms? Example: Knurling, face milling, end facing, outside diameter, etc. - Uses a multitude of forms of expression: graphic, charts , oral, written and media <p>Application (25%)</p> <p>The student shows the transfer of knowledge and skills to new contexts and concepts</p> <ul style="list-style-type: none"> - Does the student explain new machining procedures and 	<p>Growing Success</p> <p>Performance standards - The achievement chart Pgs. 16 - 25 Evaluation Policy, pg.38 <i>" ...Evaluation focuses on the student's achievement of the overall expectations..."</i></p> <p>Teacher Tip</p> <p>Always refer back to pg. 39 of the Growing Success document: <i>" The teacher will consider all evidence collected through observations, conversations and student products."</i></p> <p>And also:</p> <p><i>" Teacher will consider that some evidence carries greater weight than other evidence....Teachers will weigh all evidence of student achievement in light of these considerations and will use their professional judgement "</i></p> <p>Ontario Curriculum</p>

<p>connect them to previous knowledge? Example: The speed and feed required for knurling based on previous knowledge of other tools / ways to keep the handle concentric when removing and replacing in the lathe chuck</p>	<p>Curriculum strands and expectations for TMJ4C: A1.1.1,1.2,2.4,4.7,4.8 B1.1,1.4,2.1,C2.3,2.4,D2.3,2.4,2.5,2.6</p> <p>Math Success When evaluating portions of the document that will include theorems and charts, consider the math success document and employing various strategies to assess and evaluate <i>“..Multiple strategies – such as observations, portfolios, journals, rubrics, tests, projects, self-assessments, and peer assessments – tell students that the teacher appreciates their daily contributions and does not base evaluations solely on test results (Consortium of Ontario School Boards, 2003)....”</i></p>
<p>Activity 3 Accommodations</p>	<p>Connections</p>
<ul style="list-style-type: none"> - Use resources outside your classroom to assist identified students with IEPs (Example: Connect with GLE/ Learning Strategies Teachers to request time in their class to work on and request help.) - Always provide extra time for those students that have that allowance in their IEP - Use the documents from The Think Literacy resource - Analyze the exemplar with each student individually - Assist students on how to incorporate the section on the 	<p>Think Literacy The Think Literacy document is an excellent resource for help with writing reports (pg.144-146)</p> <p>Teacher Tip -The resource listed above is a good strategy</p>

<p>relationship between the manufacturing industry and the First Nations</p>	<p>to assist students with accommodations.</p> <p>Equity (pg. 7)</p> <p>The ability to reach every student can wane when Technological students are faced with completing written reports. Remember the policy that identifies our core priorities in our Equity Initiative:</p> <ul style="list-style-type: none"> - High levels of student achievement - Reduced gaps in student achievement - Increased public confidence in publicly funded education <p>Teachers must strive to reach these goals in the classroom with all students.</p> <p>Growing Success (pg. 70)</p> <p>Refer to the policy regarding students with special educational needs: Modification, accommodations, and alternative program</p> <p>FNMI / Teacher Tip</p> <p>Consider a visit of your board's First Nations resource Teacher</p>
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Consolidation & Connections (Provide Opportunities for Reflection)

Activity 3 Reflection Paper/Exit Card	Connections
<p>Final Engineering report submittal / Interview (optional) The submission of the Engineering report is the final step, however using conferencing as an additional data collection technique, the teacher will use a check brick to assess the report in a way that the traditional rubric may leave the student at a disadvantage. The check brick will have “ look fors “ that should be found in the body of work. (APPENDIX D: Check Brick)</p>	<p>Growing Success The interview is considered conferencing and can be used as evidence of work in addition to the written report</p>

Materials, Tools and Resources

Activity 3 Materials and Tools
<p>Engineering report exemplar Measuring tools: Callipers, micrometers, steel rule, tape measure Paper PED or workstation Bound notebook (optional) Usb (student may submit electronically)</p>
Activity 3 Websites
<p>http://www.aboriginalironworkers.ca/tradition http://www.theglobeandmail.com/news/national/why-the-mohawks-are-no-longer-walking-the-high-steel/article13941326/?page=all Google Classroom https://classroom.google.com Youtube https://www.youtube.com OCTE Safe docs http://www.octe.on.ca Ontario Skills Passport http://www.skills.edu.gov.on.ca/OSP2Web/EDU/Welcome.xhtml http://www.practicalmachinist.com</p>

Activity 3 Publications

Ontario skills Passport
School Effectiveness Framework
Differentiated Instruction Educator's Guide
Growing Success
The Ontario Curriculum: Grades 11 and 12 , Technological Education
Think Literacy
Technology of Machine Tools, S. Krar
The Machinery Handbook, Industrial Press
The New American Machinists Handbook, McGraw Hill
<http://www.theglobeandmail.com/news/national/why-the-mohawks-are-no-longer-walking-the-high-steel/article13941326/?page=all>

Activity 3 Computer Software

Markbook
CAD software (if available)
Internet connectivity

Activity 3 Human Resources

Visiting members of Industry
Teaching Assistant
SHSM leaders (if applicable)
OYAP representatives
Guidance Counsellors (visit for course selection)

Activity 3 Other

Visiting Alumni (Graduates in workplace, apprenticeship and Post Secondary studies)
Community members
In School Teachers of other courses (possible counselling or dual teaching leading to interdisciplinary course development)

Activity 3 Appendices

Project Evaluation Rubric: Appendix C
Interview check Brick: Appendix D