THJ3M

Green Industries

Pergola/Integrated Seating Area (PISA)

Project

Abstract

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PROJECT OVERVIEW

This section is a component of a unit theme to design and install an outdoor classroom for a school yard. The focus of this section is to investigate ideas and design processes for building a landscape shade structure. This would provide students with shade, seating (optional) and temporary cover from the elements for small outdoor group activities.

A strong emphasis will be placed on the research, design and build skills for this project while adhering to Green Industries curriculum. Other skills acquired, such as project management and product development will be helpful and can be applied to other product design projects in the following units.

PROJECT CHALLENGE

For many schools, outdoor classrooms and natural playground installations are becoming very popular. In this project, students are asked to research, design and build a landscape shade structure. This would be a Pergola/Integrated Seating Area (PISA) to work in conjunction with a new outdoor classroom.

The Pergola/Integrated Seating Area will be designed and constructed as either a stand-alone installation or complementary to the sitting/resting pad. This will be a decision by your group; however, this project section documents the requirements, needs, and resources for the stand-alone option.

As part of the Green Industries program, the design and fabrication of the elements should be based on sustainable practices wherever possible. This suggests that reuse of materials occur and that dimensions of materials be adjusted to meet the project challenge while reducing the amount of materials needed.

Documentation that will be required to record the project as-built components, which can be shared, should include but not be limited to: concepts, working drawings (plans, elevations, axonometric/perspective, details), and list of materials (i.e. cutting lists, parts list, hardware schedules, etc.). Finally, a work schedule and time log is strongly recommended.

CONNECTIONS

SEF Component 6: Home, School, and Community Partnerships

Indicator 6.3 The school and community build partnerships to enhance learning opportunities and well-being for students.

Collaborate with feeder schools for designing, constructing, and installing the project.

Differentiated Instructions (DI)

Provide an open-end approach when having students select a product. Have students choose their own product. Illustrate different examples.

The recommended material is recycled wood. Plastic lumber is also recycled but less cost effective. Alternative materials may be suggested and used.

Innovative, Creativity, Entrepreneurship (ICE)

This project can be part of an ICE initiative whereby, through collaboration with the art, business, and other technology program areas (e.g., Manufacturing or Construction Technology). As part of an overall project team, students can plan, design, build and apply cost estimates to community projects such as park bench designs or outdoor classrooms.

PROJECT CRITERIA	EXAMPLES
Instructions: Students will research, design and build a Pergola/Integrated Seating Area suitable for an outdoor classroom. **Criteria:** ▪ The pergola structure should reflect traditional pergola designs. ▪ Constructed or fabricated from reused wood. (e.g. rafters, 2 x 4's used for framing, etc.) ▪ The seating component can be used inside or outside the pergola structure or stand-alone (i.e. moveable). ▪ The two main components can be tied together with a third component such as a planter or trellis. ▪ Must include a complete set of working drawings and an assembly drawing with a parts and materials list. ▪ The final components should be interesting yet simple to construct, maintain, and relocate. **Design Considerations:** ▪ Maintain human scale/proportion for all components. ▪ Function wins over Form. ▪ The weight of constructed components are significant safety and logistical factors. ▪ The final components can have more than one configuration (i.e. not fixed or permanently installed or attached.	

WEBSITE SAMPLES

- http://www.betterhomesandgardens.com
- http://www.canadianhomeworkshop.com
- http://www.customoutdoorstructures.com
- http://www.homedepot.ca
- http://www.lowes.ca
- http://www.pergolaplans4free.co.uk

PROJECT SYNOPSIS and TIMELINES

Activity #	Activity Title/Name	Time (hrs.)	Curriculum Expectations	Assessment & Evaluation	Connections
1	Project Research and Design Conceptualization	4.0	Overall A3, B.1, B.3 Specific A3.1, A3.3 B1.1, B3.2	▪ K/U ▪ Thinking ▪ Comm	▪ Ontario Curriculum ▪ Growing Success ▪ Differentiated Instruction (DI) ▪ SEF ▪ STEM ▪ Math Literacy ▪ Literacy ▪ ICE ▪ First Nations/Metis (FNM)
2	Project Development	17.0	Overall A3, B.1, B.3 Specific A3.1, A3.3 B1.1, B3.2	▪ K/U ▪ Thinking ▪ Apply ▪ Comm	▪ Ontario Curriculum ▪ Growing Success ▪ Differentiated Instruction (DI) ▪ SEF ▪ STEM ▪ Math Literacy ▪ Literacy ▪ ICE ▪ First Nations/Metis (FNM)
3	Project Documentation	3.0	Overall A3, B.1, B.3 Specific A3.1, A3.3 B1.1, B3.2	▪ K/U ▪ Thinking ▪ Comm	▪ Ontario Curriculum ▪ Growing Success ▪ Differentiated Instruction (DI) ▪ SEF ▪ STEM ▪ Math Literacy ▪ Literacy ▪ ICE ▪ First Nations/Metis (FNM)

Activity #1 Project Research and Design Conceptualization

Activity Description:

There are numerous traditional pergola designs. Most are similar with variations relating to the attachment pattern of beams, cross braces, double cross braces, and overlaps. In addition, beams will have an ornamental trim to their end sections, often mitered or curved/rounded cuts. The supporting posts (columns) of pergola structures also vary and are the bulkiest structural member as they support the resting top beams.

Pergolas in both public spaces and residential back yards are useful and attractive features, providing a sense of enclosure and some protection from weather conditions. This sense of enclosure also provides a perception of privacy. These qualities are enhanced when additional components are added such as shade screens and/or roofing. These design features are incorporated based on client needs/wants, available materials, budget and even land use/zoning guidelines. For this PISA project, the senses of enclosure and privacy are replaced by the sense of gathering and community.

This project also requires a seating arrangement that is integrated as part of the pergola structure. To this end, the project challenge will be to design, construct, and document both a pergola structure and seating structure that are not only integrated, but complementary. As indicated in the Project Criteria, the seating component can be stand-alone but still complementary to the pergola structure.

In this activity, students are asked to research and conceptualize (brainstorm) ideas for simple pergola and seating plans and produce a design drawing.

Activity # 1 Criteria and Instructions

Styles and Types:

- Research and record the types of: pergola styles, post/column supports, cross braces, screens, roof coverings, materials, hardware requirements, and wood finishes.
- Include seating plans and arrangement (configuration).
- Investigate theories of public spaces for discussions of seating as well as chair design principles.

Assembly Techniques:

- Be certain to review and take note of assembly techniques including the sequence of installing or disassembly, and tools and equipment recommended.
- Anticipate any problems by doing a mock up model of a section of the pergola. For example, cutting wood joints to fit one cross brace over/with a supporting brace and/or post.
- Develop and test a working model of seating patterns taking specific note of height, depth(width), and configuration (straight, half circle, circle, etc.)
- Use the recommended design and any mock up model to start a material/hardware list noting special items such as bolt/screw size, length and securement.

Finishing Techniques:

- Review wood finishing techniques by using recycled material (off cuts, waste, etc.) to apply different grades of sandpaper grit, wood stains, and preservatives to the recycled materials to assess their application and utility.

Research Sources:

- Utilize an assortment and variety of resources in researching and reviewing your findings.
- Document by proper referencing and citing of resources reviewed and referenced.

Report Presentation:

- Drawings and support material such as details and lists, for example, should be organized in either Design Brief or Professional Report format.
- Documentation of progress throughout as this will provide a more detailed report presentation.

MINDS ON

ENGAGING PRIOR KNOWLEDGE

Activity #1 PRIOR KNOWLEDGE	CONNECTIONS
Prior Knowledge Required The student will have: ▪ Group work skills (responsibilities, commitment, conflict resolution), ▪ Communication skills (verbal, writing, graphic), ▪ Individual research skills to use a variety of resources (Internet, magazines, interviews, etc.) ▪ Basic computer skills (word processing, spreadsheet, graphic), ▪ Math skills for length, area, geometry calculations, ▪ Respect for the rights, responsibilities, and contributions of self and others; ▪ Knowledge of report formats based on Grade 11 THJ3M or Grade 10/11 TDJ 3M course(s).	**SEF Component 1: Assessment for, as, and of learning.** **Indicator 1.3** Students and educators build a common understanding of what students are learning by identifying, sharing and clarifying the learning goals and success criteria.
Activity #1 PLANNING NOTES	**CONNECTIONS**
▪ Check all recommended resources prior to beginning lesson and activity. ▪ Ensure online videos such as those on YouTube are correctly referenced/bookmarked, ▪ Ensure that all computers are in working order and that Internet access is available. ▪ Check school Wi-Fi for accessibility. ▪ Review all activities and prepare all resources (handouts and materials) necessary for the delivery of content – have extra copies where applicable. ▪ If using collaboration software, be sure that all posts are updated and ready for student interaction. ▪ Review learning goals and success criteria so that they can be identified, shared and clarified with students and parents. ▪ It is recommended that all resources be posted to your board collaboration system to avoid too many handouts and to ensure full accessibility. ▪ Avoid printing, especially high resolution images, detailed colour renderings, or unnecessary pages. ▪ This activity is ideal for allowing students to use their own personal electronic devices in their research. ▪ Select and photograph local public and private examples of pergolas and seating arrangements that may be of interest to students. Mention examples that are close to the school.	**SEF Component 3: Student Engagement** **Indicator 3.3** Students are partners in dialogue and discussions to inform programs and activities in the classroom and school that represent the diversity, needs and interests of the student population. Classroom activities are created collaboratively and reflect the diverse needs and interests of students. In selecting their designs and in constructing of their solution, students will be contributing as users and therefore should speak to other students in the school community about their designs.

ACTION INTRODUCE OR ENTEND LEARNING

Activity #1 Instructional Strategies	Connections
TEACHER: The Challenge ▪ Introduce the design challenge. Be sure to clearly describe expectations. Use previous design portfolios to give students visual exemplars that provide a clear vision of the final product The Design Team ▪ Teacher to establish design teams of 2-3. Teacher may modify teams depending on strengths and weaknesses. ▪ Discuss best practices regarding group work. Take the opportunity to discuss successful group work approaches as well as responsibilities. ▪ Provide students with examples of time logs particularly as they relate to work tasks (Appendix A). Project Management ▪ Introduce lesson on project management. ▪ Describe project planning part as one of the initial stages of the project challenge. ▪ Provide examples to emphasize tasks, phases, milestones, through a GANTT Chart approach to project planning. (Appendix B) ▪ Provide students with a basic template of a GANTT Chart if spreadsheet software is not available. ▪ Have each student team prepare a schedule of activities (tasks) and assign roles/responsibilities as well as estimated times for completion. Research ▪ Introduce activity and criteria. Discuss link with Grade 11 courses. ▪ Describe what students are expected to learn and how their learning will help with the overall project. Provide students a clear vision of where this activity will lead. ▪ Tell students, at the outset of instruction, what the learning goals are. Refer frequently to the learning goals and design process during instruction. ▪ Show students exemplars to better help them understand activity expectations. **Student:** ▪ Establish, with the aid of the teacher, a design team of 2 or 3 students. ▪ Use project management tools and techniques to plan and	**SEF Component 1 Assessment for, as and of Learning** **Indicator 1.3:** Students and educators build a common understanding of what students are learning by identifying, sharing and clarifying the learning goals and success criteria. Provide students with simple, yet clear and effective examples of similar previous projects, the steps of a design process, and minimum (open-ended) requirements. Discussions of group dynamics should be discussed openly with students demonstrating, through questions and discussion, expectations, roles, and responsibilities. An example, or template, for time logs/sheets should assist students with project management skills. **SEF Component 4 Curriculum Teaching and Learning** **Indicator 4.4-**Students are engaged in exploring real-world situations/issues and solving authentic problems. Critical thinking skills are taught, modelled, practised and developed. **Differentiated Instructions (DI)** Flexible Learning Groups In a differentiated classroom, students are grouped and regrouped, frequently and flexibly based on their; readiness to learn a concept; interest in a concept earning preferences in working with or thinking about a concept; or environmental or social sensitivities. **SEF Component 3 Student Engagement** **Indicator 3.1:** Learning experiences are engaging, promote collaboration, innovation and creativity (i.e. are clear, meaningful, challenging, productive and include problem solving and critical thinking on a variety of issues). Ongoing feedback between and among students and teachers enables students to refine

organize their work. ▪ Create a GANTT Chart listing tasks, phases, timelines and responsibilities – milestones introduced and noted. ▪ Participate in collaborative/cooperative learning through group research. ▪ List, describe, and document a number of pergola styles and seating configurations based on research review. ▪ Analyze research and select a style and seating configuration. ▪ Additional component such as planters may be included at this time. ▪ Select a solution that answers the design challenge and is site appropriate. ▪ Document results as part of the process. ▪ Use exemplars to help understand what quality work looks like and to develop or refine their understanding of success criteria.	both thinking and products. **SEF Component 4 Curriculum Teaching and Learning** **Indicator 4.2** A clear emphasis on high levels of achievement in literacy and numeracy is evident throughout the school. Sort and analyze information from a variety of sources. Summarize and synthesize in order to understand what they read, hear and see. Listen actively to others (e.g., ask questions, share ideas and strategies and build on the ideas of others). Communicate their learning through a variety of modes and forms for different purposes and audiences. **Indicator 4.5** Instruction and assessment are differentiated in response to student strengths, needs and prior learning. Work in groups and follow collaborative group norms. **FNMI** To address the FNMI document, schools will strive to "employ instructional methods designed to enhance the learning of all First Nation, Métis, and Inuit students/" It is recommended that students research some First Nation, Métis, and Inuit housing and/or shelter designs. **Ontario Skills Passport** **Literacy** skills in reading, writing, oral communications, document and computer use. Thinking skills in decision making, finding information, and critical thinking
Activity #1 Assessment and Evaluation	**Connections**
Assessment strategies and tools in this activity will include	**Growing Success**

opportunities in monitoring students' achievement levels as well as learning skills. Feedback through comments and informal review throughout the process should take place.

Knowledge and Understanding:

- Students will be evaluated partially on their general knowledge and interpretation of traditional pergola design, seating requirements for individuals and small groups/settings.
- Students will be required to demonstrate that their concepts, design, working drawings, details, and work plan adhere to similar projects carried out in the industry.

Thinking:

- To assess students on their thinking skills, teachers will evaluate students' recommended design concept with respect to a rationale of why students chose a particular solution.
- In addition, students will be evaluated on how detailed their work plan (tasks, phases, milestones, etc.) and assembly techniques or details are.

Communication:

- All hand-drawn work as well as original computer generated work (e.g. Sketch Up) will conform to professional design conventions and standards.

Learning Skills:

- Through observation and conferencing, students will be assessed formally or informally with positive feedback.
- The teacher will document the following:
  - the student's skills pertaining to conflict management skills;
  - student's ability to work effectively as a team member;
  - student's initiative, leadership and participation in a group.

Assessment Tools:

- Appendix C: Assessment Rubric

Using the achievement chart to establish rubric

SEF Component 1 Assessment for, as, and of Learning Connections

Indicator 1.1 Assessment is connected to the curriculum, collaboratively developed by educators and used to inform next steps in learning and instruction.

Students are supported and assessed in the ongoing development of learning skills and work habits.

Indicator 1.2 A variety of relevant and meaningful assessment data is used by students and educators to continuously monitor learning, to inform instruction and to determine next steps.

A variety of assessment strategies and tools that meet the needs of all students are used to improve learning and inform instructional decision.

Indicator 1.4 During learning, timely, ongoing, descriptive feedback about student progress is provided, based on student actions and co-constructed success criteria.

Teachers are to provide timely, explicit and constructive feedback to student groups that relate to the success criteria – this approach should be descriptive in nature rather than evaluative.

Students will use the descriptive feedback received based to revise and refine their demonstrations of learning,

Indicator 1.6 Assessment of learning provides relevant and meaningful evidence to evaluate the quality of student achievement at or near the end of a cycle of learning and to determine next steps.

The final rubric for this activity addresses the 'assessment of learning' which is based on the performance standards set out in the Achievement Chart. The assessment criteria of this activity align with both the overall and specific expectations and form the basis of assessment of learning.

	Learning skills and work habits are evaluated regularly through monitoring and progress and regular conferencing with individual students.
Activity #1 Accommodations	**Connections**
▪ Teachers are to be familiar with exceptional students' Individual Education Plans (IEPs) for legislated accommodations and consult with Program Support teachers and educational assistants as well as school-based support staff (e.g. Child and Youth Worker). By doing this, teachers will be aware of and can implement prescribed accommodations. ▪ Teaching Strategies for students with special needs may include: – grouping design teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses; – providing a list of designs and suggestions where enrichment and challenge is needed, allowing students to be peer tutors/mentors; – pairing experienced students with those who are not yet familiar with the techniques.	**SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.5** Students are explicitly taught and regularly use self-assessment skills to monitor, improve and communicate their learning, within the context of the Ontario curriculum and/or Individual Education Plan (IEP). Students will participate in the collection and development of personal documentation of their learning (e.g., portfolios, learning logs, course notebooks, student files) that assist them and their teacher in informing the next steps in learning. **Indicator 1.7** Ongoing communication about learning is in place to allow students, educators and parents to monitor and support student learning. School-wide processes are developed to inform and engage parents and students in learning, assessment practices and how next steps in learning are determined. Students will engage in learning conversations and discussions with educators and peers that elicit evidence of understanding.

CONSOLIDATION & CONNECTIONS

Provide Opportunities for Reflection

Activity #1 REFLECTION PAPER/LOGS	**CONNECTIONS**
Students will be asked to write a short reflection paper at the end of this activity. The paper will include a summary of the activity and should include all key and technical terms used. The purpose of this paper is to allow students to practice the	**SEF Component 4 Curriculum, Teaching, and Learning** **Indicator 4.2** A clear emphasis on high

use of proper written language skills and also help students reflect on their experiences throughout the process and unit. Students will be asked to create a reflection paper by summarizing and adding to their daily time logs.	levels of achievement in literacy and numeracy is evident throughout the school. Students will acquire, build on, and apply oral communication, reading, writing and media literacy knowledge and skill through their project experiences. In addition, students will communicate their learning through a variety of modes and forms for different purposes and audiences.

MATERIALS, TOOLS and RESOURCES

Activity #1 Websites for Curriculum:

Curriculum Websites:

- Green Industries Curriculum Document
  http://www.edu.gov.on.ca/eng/curriculum/secondary/teched.html
- Ontario's Equity and Inclusive Education Strategy
  http://www.edu.gov.on.ca/eng/policyfunding/equity.pdf
- Ontario Skills Passport
  http://www.skills.edu.gov.on.ca/OSP2Web/EDU/DisplayEssentialSkills.xht
- Growing Success Document
  http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf
- Student Success Differentiated Instructions Document
  http://www.edugains.ca/resourcesDI/EducatorsPackages/DIEducatorsPackage2010/2010EducatorsGuide.pdf
- Student Effectiveness Framework Document
  http://www.edu.gov.on.ca/eng/literacynumeracy/SEF2013.pdf
- Math Literacy Document
  http://www.edu.gov.on.ca/eng/document/reports/numeracy/numeracyreport.pdf
- Think Literacy Document
  http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy/library.html
- First Nations, Metis, and Inuit Education Policy Framework
  http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf

Resource Websites:

- http://www.betterhomesandgardens.com
- http://www.canadianhomeworkshop.com
- http://www.customoutdoorstructures.com
- http://www.homedepot.ca

- http://www.lowes.ca
- http://www.pergolaplans4free.co.uk

Activity #1 Publications:

- Design Magazines including online (landscape, construction, woodworking, hobby)
- Professional Journals (OALA, ASLA, Landscape Ontario)

Activity #1 COMPUTER SOFTWARE

- Word Processing
- Spreadsheet
- Multimedia (e.g. PowerPoint)
- Sketch Up
- DynaScape

Activity #1 HUMAN RESOURCES

- Program Support staff
- Cooperative Education teachers, Math and English teachers, Construction teachers
- Guest Speakers: First Nations, Metis, Inuit guest speakers
- Landscape Designers/Architects
- Landscape Contractors
- Municipal Parks Department Staff

Activity #1 OTHER

- Board computer policies

Activity #1 APPENDICES

- Appendix A: Time Log Example
- Appendix B: GANTT Chart Example
- Appendix C: Assessment Rubric

Activity #2 Project Development

Activity Description:

In this activity, students will prepare and assemble the pergola/integrated seating area components for installation based on the design drawing. Student teams will follow their developed work schedules (GANTT Chart) outlining the tasks that are to be completed in sequence. Materials for the posts, beams, braces, seating surfaces, and supports will need to be prepared according to the parts list (cutting list). All materials should be prepared per construction convention (dimensioned, straight, planed/smoothed, etc.) and stored correctly and safely in the work area.

Students will follow all health and safety requirements, working both in groups and independently, as required. This project will utilize components that are larger than normal, for example, 7 foot (2.1 m) posts or longer/taller. Cross beams and braces will be supported by these posts and will be even longer. Students will require large, organized work areas free of clutter to move materials around and will need to prepare for this.

Components, using minimum materials, will need to be assembled flat on floors or work benches rather than in an upright position above the floor/ground surface. This means as little step stool or ladder use as possible – at least until final assembly if deemed necessary. Emphasis is placed on proper material preparation and storage as well as working sequence to construct and assemble the components.

Activity #2 Criteria and Instructions

Material Preparation:

- Using your final concept sketch, parts list (cutting list), prepare all materials to final finished dimensions.
- Use equipment and tools only after completing safety demonstration and receiving sign-off from the teacher.
- Store materials as required – label and number each part for ease of assembly and identification of group materials.
- Anticipate any problems by doing a mock up model of a section of the pergola.

Assembly Techniques:

- Begin the process of assembling the prepared components keeping in mind the sizes, work area, and daily time restrictions.
- Recall the mock-up model when assembling your components – sequence of assembly, types and number of tools required, cutting wood joints to fit one cross brace over/with a supporting brace and/or post, etc.
- Complete assembly of pergola and seating unit(s) – ensure stability of components at all times.

Finishing Techniques:
- Recall wood finishing techniques of recycled materials – make necessary adjustments to amounts, colours, etc. if applying a stain/preservative.
- It is recommended to avoid using these materials.
- If used, follow MSDS/WHMIS protocol when applying paints, stains, preservatives to materials.

Documentation:
- Document your progress throughout as this will provide a more detailed report presentation.
- Take photos of work in progress, completion of each major phase or task (milestone), and final product.

MINDS ON

ENGAGING PRIOR KNOWLEDGE

Activity #2 PRIOR KNOWLEDGE	CONNECTIONS
Prior Knowledge Required; The student will have: ▪ Group work skills (responsibilities, commitment, conflict resolution), ▪ Communication skills (verbal, writing, graphic), ▪ Individual technical skills to use a variety of power equipment such as: table saw, jigsaw, band saw, and planer. Hand tool skills required: tape measure, framing/speed square, drill, hammer, sockets/wrenches. ▪ Math skills for length, angle, area, geometry calculations, ▪ Respect for the rights, responsibilities, and contributions of self and others; ▪ Working knowledge of projects in previous technological education courses particularly THJ, TWJ, and TDJ.	**SEF Component 1: Assessment for, as and of Learning** **Indicator 1.3** Students and educators build a common understanding of what students are learning by identifying, sharing and clarifying the learning goals and success criteria. Assessment and instruction are collaboratively designed to ensure a clear understanding of the learning goals and success criteria **Teacher Tips** It may prudent to create diagnostic assessment tools to assist in determining specific prior knowledge. (e.g. simple questionnaire, definition of key technical terms, review of a plan or sketch, completion of a cost estimate). **Ontario Skills Passport** Numeracy skills in measurement and calculations.

Activity #2 PLANNING NOTES	CONNECTIONS
▪ Review shop/lab procedures: power button, panic/stop buttons, dust collector vents, brooms, brushes and dustpans, tool and storage cabinets, tool crib, material storage, power equipment, specialized tools, lab duties/duty list, first aid and eyewash stations. ▪ Review all equipment and tools for defects, operating condition, attachments/accessories. Remove, replace, or lock out as needed. ▪ Ensure all materials are available for models, preparation and assembly including hardware. ▪ Conduct safety lessons and provide equipment/tool certification (sign-off) to students. ▪ Review individual and group responsibilities. ▪ Review safety and emergency protocols. ▪ As students prepare materials, teacher should monitor equipment or tool use and check lengths/widths etc. where possible. ▪ Teachers should consult with groups regarding cutting lists, sketches or concept and issues regarding preparation or assembly. ▪ Arrange for students to do an in-school tour to review areas for installing pergola/integrated seating. ▪ Check scale, proportion, and appropriateness of components.	**SEF Component 2 Classroom Leadership Connections** **Indicator 2.2** Processes and practices are designed to deepen understanding of the curriculum and refine instruction to improve student learning and achievement. After teacher demonstration and facilitation of tools, equipment, and techniques, students will independently apply knowledge, skills, concepts and processes in different contexts from examples provided. **Growing Success** Diagnostic assessment: This would be considered a strategy in addressing an assessment for learning

ACTION INTRODUCE OR ENTEND LEARNING

Activity #2 Instructional Strategies	Connections
TEACHER ▪ Lead an in shop/lab tour indicating all elements (tools, storage, etc.) especially safety aspects and procedures. ▪ Discuss safety scenarios as they relate to power, equipment use, and emergencies. Discuss fire alarm and lock-down protocols. ▪ Provide demonstrations of material preparation for this project. ▪ Provide examples of assembly techniques. ▪ Mark out work areas for groups including material storage. ▪ Reinforce the need for safety and general housekeeping duties. ▪ Before material preparation or assembly, conference with groups to ascertain their understanding of tasks, sequence, and work and safety procedures. ▪ Show examples of similar projects completed to keep students on track with their design and use of time. ▪ Remind students of user tendencies and scale and proportion. ▪ Demonstrate to students the economic and environmental efficiency of used materials. For example, using a 2 x 4 from wall framing and cutting it along its length (ripping) will save material, create a lighter structure but still achieve the overall goal of a pergola. ▪ For seating, used 2 x 4's from blocking or off cuts from wall studs (i.e. jack stud use) will provide pieces that are long enough for seating surface, either flat up or edge up. ▪ Use the materials to create different seating configurations, for example. ▪ Excess material can be used to construct a trellis – this may be incorporated into the project as part of the pergola. It also allows for vines to grow, creating a structure that weaves into the outdoor classroom more naturally. ▪ For constructing the pergola, inform students that a "ladder" approach for the side pieces is part of their goal – this often makes the pergola structure components easier to conceptualize. ▪ It is anticipated that reused construction component materials will be utilized meaning that the primary wood material is either spruce or pine. Discuss with students the differences in selecting a premium material such as cedar/western red cedar as opposed to spruce/pine. ▪ Explain and demonstrate the techniques for using hardware	**The Ontario Curriculum, Grade 11-12, Revised 2009** Front Matter of this document describes problem solving methods and approaches that include the design process and reverse engineering Overall Expectations: A3, B1, B3 Specific Expectations: A3.1, A3.3, B1.1, B3.2 **Think Literacy** Oral Communications-Whole Class Discussion-Discussion Etiquette Small group discussion strategies can also apply here. **SEF Component 2 Classroom Leadership Connections** Indicator 2.5: Staff, students, parents and school community promote and sustain student well-being and positive student behaviour in a safe, accepting, inclusive and healthy learning environment. In addition to the necessary knowledge and skills, the learning environment provides modelling for students to make safe and healthy decisions. **SEF Component 4: Curriculum, Teaching and Learning** Indicator 4.1 A culture of high expectations supports the belief that all students can learn, progress and

such as lag screws, carriage bolts, washers, lock washers, corner brackets. Be sure to discuss size (e.g. # 4 vs. #8) as well as length, etc. This should include proper tool use such as sockets, wrenches, etc.

STUDENT

- Students should take note of all exits, stop buttons, first aid stations, emergency routes including lock-down procedures and all other elements shown in the tour.
- Ideally, a basic floor plan should be referred to as it may have been completed at the beginning of the course, or another course.
- Replicate the teacher demonstration of material preparation and assembly techniques through either the mock-up model or separate "rough copy" versions.
- Respect the work area and lab duty sheet as assigned.
- Student groups to review their drawings, work schedule, duties and responsibilities sheets, cutting list, parts list, and tool sign-off or sign-out before starting preparation and assembly.
- As components are constructed, a "dry-fit" should occur to ensure that all components will assemble together without problems.
- Select the best solution for the design challenge and begin the phase of assembly.
- Additional components such as planters and/or trellises may be constructed as an enhancement to the pergola/integrated seating area – again, a "dry-fit" approach should take place.
- Student groups will test out the components for functionality and scale/proportion. Adjustment may be needed. All components should be tested as a single structure.
- Students will be able to discuss and rationalize their choices for materials, preparation and assembly tasks and techniques, hardware selection, efficient use of materials, and how the solution best fits the selected outdoor installation area.
- Students will listen actively and critically to accept suggestions or recommendations yet be assertive and positive in presenting their chosen solution.

achieve

Ongoing monitoring and moderation of student work informs instruction to ensure that each student learns, progresses and achieves stated goal.

Ontario Skills Passport

Literacy skills in reading, writing, oral communications, document and computer use.

The Ontario Curriculum, Grade 11-12, Revised 2009

Front Matter of this document describes the Fundamental Technological Concepts

Math Literacy

Valuing mathematics implies being productively disposed towards the subject. It involves seeing mathematics as sensible, useful, and worthwhile, and seeing oneself as able to learn and apply it daily.

Teachers must create a climate whereby all students can make sense of the mathematics they are learning and gain confidence in their mathematical ability. In this project, students will see mathematics as useful in understanding metric and imperial units as they apply to layout, construction, assembly, and costing.

FNMI

When describing material selection, describe some aboriginal concerns for our environment in terms of natural resources. To address the FNMI document, schools will strive to "employ instructional methods designed to enhance the learning of all First Nation, Métis, and Inuit students", it is recommended that students research some First Nation, Métis, and Inuit shelter designs.

SafeDocs/Safety Videos

Review documents and videos that focus on construction-based projects.

Activity #2 Assessment and Evaluation	Connections

Assessment strategies and tools in this activity will include opportunities in monitoring students' achievement levels as well as learning skills.

Application

- Students will be assessed on their ability to correctly and safely perform both the preparation and assembly techniques as demonstrated by the teacher and during their mock-up models.
- This should utilize a checklist and safety passport approach. As students successfully complete the performance safety task, the teacher will sign-off their basic competence.
  With respect to assembly, a pre-determined checklist of sequenced tasks will ensure successful and efficient completion.
- The final components form part of a larger unit, however, each must be completed to performance and function based on their use. i.e. the posts must be plumb and stable while holding the beams and cross braces rigidly; the braces and joints must fit tightly and not have gaps, for example.

Thinking

- To assess students on their thinking and inquiry skills, teachers will evaluate students' ability to logically plan the work tasks in preferred sequence, carry out the tasks that produce a functional yet creative solution.
- Students will also be assessed on their ability to develop an idea to functional completion as evidenced by concept sketches, work plan, and calculations of measurement and associated lists. This will be evaluated using a rubric tool.

Knowledge and Understanding

- Upon completion of the project primarily (and throughout the process), students will demonstrate: their base knowledge of tool and equipment use, application of hardware and general assembly techniques, finishing techniques, ability to calculate measurements, record changes, and log time.
- Students will also be able to discuss their choices of materials, style, configuration(s), hardware selection, finishing techniques, while rationalizing their solution. The checklist and safety passport will be supplemented by teacher anecdotes through observation and informal discussion.

Communication

- As with teacher anecdotes above, students will communicate clearly and succinctly to put forward their design, techniques, and overall choices or decisions. Maintaining an assertive and positive approach is strong communication skill development.
- As mentioned earlier, students will be required to present documentation of their project, paying particular attention to the changes made ("as-built"). This will take place in the form of a rubric assessment tool.

Growing Success

Using checklists allow for assessment as learning, also have conversations with the student about their progress to keep the process transparent. Final evaluations should not occur until the student has had verbal feedback along the way – assessment *as* learning.

Assessment Categories
K/U (30%),
T (30%),
A (30%),
C (10%)

Differentiated Instruction (DI)

<u>Tiering:</u> Consider weighting summative activities according to destination (i.e., weigh the application higher for trade/college bound students…Th & C higher for university bound students)

SEF Component 1 Assessment for, as and of Learning Connections

<u>Indicator 1.1</u> Assessment is connected to the curriculum, collaboratively developed by educators and used to inform next steps in learning and instruction.

Student learning is regularly documented to inform educator and student next steps.

Students are supported and assessed in the ongoing development of learning skills and work habit

<u>Indicator 1.2</u> A variety of relevant and meaningful assessment data is used by students and educators to continuously monitor learning, to inform instruction and to determine next steps.

A variety of assessment strategies and tools that meet the needs of all students are used to improve learning and inform instructional decision (e.g., communications, observations, demonstrations informal presentations,

	projects, lists. Sketches, etc.) Assessment tools will include marking schemes for the activities, rubric assessments, tests, checklists and anecdotal comments.
Activity #2 Accommodations	**Connections**
▪ 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. ▪ Accommodations are to be made so students do not lose dignity because of disability, poverty, lack of success, linguistic diversity or race. Teachers foster a positive atmosphere accepting of individual's uniqueness, values, and needs. ▪ While Program Support Staff can provide a detailed list of accommodations, general teaching strategies may include: ▪ grouping design teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses; ▪ providing a list of topics and suggestions where enrichment and challenge is needed, allowing students to be peer tutors/mentors; ▪ pairing experienced students with those who are not yet familiar with the techniques. Some students have obtained knowledge of building techniques in previous technological education courses. ▪ have identified students focus on one (1) aspect of the project. ▪ challenge students by having them attempt something different than they are accustomed to, but within reasonable expectation of successful completion.	**Differentiated Instruction (DI)** Encourage students to attempt tasks or sections that are unfamiliar to them but safe to undertake. Provide opportunities for peer work – more experienced students can assist those with less or no experience. **Component 1: Assessment for, as and of Learning** **Indicator 1.5** Students are explicitly taught and regularly use self-assessment skills to monitor, improve and communicate their learning, within the context of the Ontario curriculum and/or Individual Education Plan (IEP). Participate in the collection and development of personal documentation of learning (e.g., portfolios, learning logs, course notebooks, student files) that assist in informing the next steps in their learning

CONSOLIDATION & CONNECTIONS

Provide Opportunities for Reflection

Activity #2 REFLECTION PAPER	**CONNECTIONS**
Students will be asked to write a Reflection Paper at the end of this project. The paper will include a summary of the activities. The	**SEF Component 4: Curriculum, Teaching, and**

purpose of this paper is to allow students to practice the use of proper written language skills. It will also help students reflect on their experiences throughout this unit. This paper should include all the key and technical terms discussed throughout the project.	**Learning** **Indicator 4.2** A clear emphasis on high levels of achievement in literacy and numeracy is evident throughout the school. Communicate their learning through a variety of modes and forms for different purposes and audiences.
Activity #2 TIME CARD/LOG	**CONNECTIONS**
Students should fill out time cards (logs) that account for what they did each day. This should be related to the work plan in order to stay on task and plan for the next day. Teachers can use the time card to align with the work plan to provide an example of how employees or contracts are paid. In addition, the time card/log can be used as an assessment tool.	**Ontario Skills Passport** Literacy skills in reading, writing, oral communications, document and computer use.

MATERIALS, TOOLS and RESOURCES

Activity #2 Websites:
▪ OCTENet Resources http://www.octelab.com/safety/teams ▪ OCTE SafeDocs http://www.octelab.com/ ▪ Ontario Association of Certified Technicians and Technologists https://www.oacett.org/ ▪ Association of Professional Engineers

http://www.peo.on.ca/
- Green Industries Curriculum Document
  http://www.edu.gov.on.ca/eng/curriculum/secondary/teched.html
- Ontario's Equity and Inclusive Education Strategy
  http://www.edu.gov.on.ca/eng/policyfunding/equity.pdf
- Ontario Skills Passport
  http://www.skills.edu.gov.on.ca/OSP2Web/EDU/DisplayEssentialSkills.xht
- Growing Success Document
  http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf
- Student Success Differentiated Instructions Document
  http://www.edugains.ca/resourcesDI/EducatorsPackages/DIEducatorsPackage2010/2010EducatorsGuide.pdf
- Student Effectiveness Framework Document
  http://www.edu.gov.on.ca/eng/literacynumeracy/SEF2013.pdf
- Math Literacy Document
  http://www.edu.gov.on.ca/eng/document/reports/numeracy/numeracyreport.pdf
- Think Literacy Document
  http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy/library.html
- First Nations, Metis, and Inuit Education Policy Framework
  http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf

Activity #2 Publications:

- Spence W. P. Drafting Technology and Practice. Peoria, Illinois: Glencoe,1991. ISBN 0-02-676290-0
- Wallach P., Metric Drafting. California: Collier Macmillan Publishers, 1979.

Activity #2 VIDEO RESOURCES

- Search for YouTube or other video resources for subject specific supports.

Activity #2 COMPUTER SOFTWARE

- CAD Software (e.g. Sketch Up, Dynascape)
- Spreadsheet Program (e.g. Excel)

Activity #2 HUMAN RESOURCES

- Guest speakers: local professionals (survey class for parents, friends and family employed in Green Industries sector), former students.
- Special Education/Resource staff Program Support staff
- Cooperative Education teachers
- Math and English teachers
- Guest Speakers: First Nations, Metis, Inuit guest speakers
- Landscape Designers/Architects
- Landscape Contractors

- Municipal Parks Department Staff
- School, Board or community computer technician

Activity #2 OTHER

- Board health and safety policies.

Activity #2 APPENDICES

- Appendix A: Time Log Example

Activity #3 Project Documentation

Activity Description:

This activity is a compilation of all the planning, design, calculating, and other information your group completed in order to build and install the Pergola Integrated Seating Area (PISA Project). It should reflect a timeline of all the activities and tasks that were undertaken. It should include any notes/sketches and additional information that was used to change the design or details, make decisions, or revise proposed components. One key aspect to documenting the process is the issue of keeping track of changes that are different from the original design. This is often referred to an as-built.

Most professional designers organize their work into drawing packages, such as a portfolio, which can generally include: sketches, concepts, recommended design, recommended or final design, working drawings, detail drawings, list or schedules of specific components or parts. This widely-used format mirrors the design process and that is why it used so often, however, this is one approach, your group may choose another approach or format.

There is also the matter of non-drawings such as lists, GANTT Charts, photos, etc. The documentation should be complete illustrating all of the work that went into the project.

Activity #3 Criteria and Instructions
The Drawing Package should include: ▪ Challenge Statement ▪ Design Brief ▪ Summary of Research Findings including images ▪ Design Concepts (sketches, elevations, plans, perspectives, axonometric) ▪ Working Drawings (assembly information, detail drawings) ▪ Bill of Materials List of Materials Cutting List, Parts List, Hardware Schedules ▪ Work Schedule (GANTT Chart), Time Log) ▪ Reflection Paper Group Evaluation

MINDS ON

ENGAGING PRIOR KNOWLEDGE

Activity #3 PRIOR KNOWLEDGE	CONNECTIONS
Prior Knowledge Required The student will have: ▪ Group work skills (responsibilities, commitment, conflict resolution), ▪ Communication skills (verbal, writing, graphic), ▪ Individual research skills to use a variety of resources (Internet, magazines, interviews, etc.) ▪ Basic computer skills (word processing, spreadsheet, graphic), ▪ Math skills for length, area, geometry calculations, ▪ Respect for the rights, responsibilities, and contributions of self and others; ▪ Knowledge of report formats based on Grade 11 THJ3M or Grade 10/11 TDJ 3M course(s).	**SEF Component 1: Assessment for, as, and of learning.** **Indicator 1.3** Students and educators build a common understanding of what students are learning by identifying, sharing and clarifying the learning goals and success criteria. **SEF Component 3: Student Engagement** **Indicator 3.4** Students demonstrate a wide range of transferable skills such as: teamwork, advocacy, leadership and global citizenship.

	SEF Component 4: Curriculum, Teaching and Learning **Indicator 4.1** A culture of high expectations supports the belief that all students can learn, progress and achieve. The focus on student achievement is evident and clearly communicated within the school and to the school community in a variety of ways. and in languages reflective of community needs. Student achievement is celebrated in an inclusive way throughout the school.
Activity #3 PLANNING NOTES	**CONNECTIONS**
▪ Check all recommended resources prior to beginning lesson and activity. ▪ Ensure that all computers are in working order and that Internet access is available. ▪ Check school Wi-Fi for accessibility. ▪ This activity is ideal for allowing students to use their own personal electronic devices in their documentation. ▪ Provide students with industry-based drawing package – these are often tender packages and can include school drawings.	**SEF Component: 4 Curriculum, Teaching and Learning** **Indicator 4.3** Teaching and learning in the 21st Century is collaborative, innovative and creative within a global context. A digital environment is an integral part of professional practice, learning and leadership.

ACTION INTRODUCE OR ENTEND LEARNING

Activity #3 Instructional Strategies	**Connections**
Teacher: ▪ Provide students with Drawing Package Checklist. ▪ Review drawing package entries – comment on legibility or appropriateness of entry. ▪ Review table of contents. ▪ Conduct preliminary review of drawing packages before group presentation to class. **Student:** ▪ Organize documentation according to checklist. ▪ Conduct preliminary review with teacher (and others as	**SEF Component 1 Assessment for, as and of Learning Connections** **Indicator 1.2** A variety of assessment strategies and tools that meet the needs of all students are used to improve learning and inform instructional decision.

available).	
Activity #3 Assessment and Evaluation	**Connections**
Assessment strategies and tools in this activity will include opportunities in monitoring students' achievement levels as well as learning skills. **Thinking:** ▪ To assess students on their thinking skills, teachers will evaluate students' ability to assemble a detailed and creative drawing package. **Communication:** ▪ The drawing package will be assessed in terms of format, content and overall appearance. **Learning Skills:** ▪ Through observation and conferencing, students will be assessed formally or informally with positive feedback. ▪ The teacher will document the following: - the student's skills pertaining to conflict management skills; - student's ability to work effectively as a team member; - student's initiative, leadership and participation in a group. - **Assessment Tools:** ▪ Appendix C: Assessment Rubric	**Growing Success** Assessment Categories T (70%), C (30%) **SEF Component 1: Assessment for, as and of Learning Connections** **Indicator 1.4** During learning, timely, ongoing, descriptive feedback about student progress is provided, based on student actions and co-constructed success criteria. Student learning and progress is clarified throughout the learning process (e.g., through interviews, conferences and learning conversations with small groups, pairs and/or individual students). Students have multiple and varied opportunities to revise and refine their demonstrations of learning
Activity #3 Accommodations	**Connections**
▪ 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 accommodations. ▪ Teaching Strategies for students with special needs may	**Component 1: Assessment for, as and of Learning** **Indicator 1.5** Students are explicitly taught and regularly use self-assessment skills to monitor, improve

include: - grouping design teams with varied abilities to allow for peer support. The teacher may choose or modify the teams depending on individual strengths and weaknesses; - providing a list of designs and suggestions where enrichment and challenge is needed, allowing students to be peer tutors/mentors; - pairing experienced students with those who are not yet familiar with the techniques.	and communicate their learning, within the context of the Ontario curriculum and/or Individual Education Plan (IEP). Educators share strategies for helping students to develop, understand and use criteria, identify strengths and areas for improvement and develop and implement goals for next steps in learning

CONSOLIDATION & CONNECTIONS

Provide Opportunities for Reflection

Activity #3 REFLECTION PAPER	CONNECTIONS
Students will be asked to write a Reflection Paper as part of completing the build project and drawing package. The paper will include a summary of the entire project. This paper should include all the key and technical terms discussed throughout the project.	**SEF Component 6: Home, School, and Community Partnerships** **Indicator 6.3** The school and community build partnerships to enhance learning opportunities and well-being for students. Learning experiences prepare students to interact positively with community partners. Students are provided with planned and purposeful learning experiences with community partners
Learning Skills Self-Assessment	

MATERIALS, TOOLS and RESOURCES

Activity #3 Websites:

- Green Industries Curriculum Document
  http://www.edu.gov.on.ca/eng/curriculum/secondary/teched.html
- Ontario's Equity and Inclusive Education Strategy
  http://www.edu.gov.on.ca/eng/policyfunding/equity.pdf
- Ontario Skills Passport
  http://www.skills.edu.gov.on.ca/OSP2Web/EDU/DisplayEssentialSkills.xht
- Growing Success Document
  http://www.edu.gov.on.ca/eng/policyfunding/growSuccess.pdf
- Student Success Differentiated Instructions Document
  http://www.edugains.ca/resourcesDI/EducatorsPackages/DIEducatorsPackage2010/2010EducatorsGuide.pdf
- Student Effectiveness framework Document
  http://www.edu.gov.on.ca/eng/literacynumeracy/SEF2013.pdf
- Math Literacy Document
  http://www.edu.gov.on.ca/eng/document/reports/numeracy/numeracyreport.pdf
- Think Literacy Document
  http://www.edu.gov.on.ca/eng/studentsuccess/thinkliteracy/library.html
- First Nations, Metis, and Inuit Education Policy Framework
  http://www.edu.gov.on.ca/eng/aboriginal/fnmiFramework.pdf

Activity #3 COMPUTER SOFTWARE
▪ Internet ▪ search for YouTube or other video resources for subject specific supports
Activity #3 APPENDICES
▪ Appendix C: Assessment Rubric