



Refuse Refuse ri-fyooz ref-yoos

A Guide to
Waste Reduction in
Manitoba Schools

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Contents

Introduction	1
We “R” Changing the Culture of Waste	3
In the Beginning	7
Next Steps	11
Sustainable Waste Minimization	15
Why Change?	21
Myths and Realities	25
Helpful Resources and Links	27
Appendices	29
Appendix A: The Hanover School Division “50% Challenge”	29
Appendix B: Baseline Data Collection Letter to Schools	31
Appendix C: Waste Reduction and Pollution Prevention (WRAPP) Fund Application	32
Appendix D: Hanover School Division 50% Challenge for Waste Reduction Kick-Start Grant	39



Appendix E: Hanover School Division's Education for Sustainable Futures (ESF) Action Plan 2012-2015	41
Appendix F: Organic Waste Diversion by Hanover School Division	47
Appendix G: HSD System-wide Industrial Composting Proposal	48
Appendix H: Industrial Composting Set-up for Schools	50
Appendix I: Recycling Waste at Your School	52
Appendix J: Industrial Composting (poster)	55
Appendix K: Garbage Only (poster)	56
Appendix L: Industrial Composting (poster)	57
Appendix M: Paper Towels Only (poster)	58
Appendix N: Think First. (poster)	59
Appendix O: Landmark Elementary School Students Make Suggestions to the Town of Landmark on How to Be More Ecologically Responsible (Spring 2013)	60
Appendix P: Time it Takes for Garbage to Decompose in the Environment	64
Appendix Q: Rethinking Garbage (poster)	65
Appendix R: Follow-up Audit Letter to Schools	66
Appendix S: Learning Outcomes Related to Solid Waste (This appendix lists the curricular connections from the various subject matter curriculum documents to the topic of waste.)	67

Bibliography	181
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Introduction

Refuse (ri-fyooz) Refuse (ref-yoos): *A Guide to Waste Reduction in Manitoba Schools* was created in order to foster discussions about what you can do in your school division to reduce waste. This guide not only gives direction, but also encourages discussion about the steps taken at Landmark Elementary School (LES) and the resulting 50% Challenge for Waste Reduction undertaken at Hanover School Division (HSD). The guide describes how the actions of students in one school brought about change in an entire school division. It is both a “how-to” and a “why-to” guide since many questions about waste reduction must be addressed in order to make a school-wide or division-wide initiative a success.



We “R” Changing the Culture of Waste

Earth is a shared place. Each person on Earth is one of over seven billion people inhabiting the planet. The action of ONE, if multiplied by seven billion repeated actions could create something incredibly positive or devastatingly negative. For each of us, there must be a starting point, a place where we are convinced of the need to reconsider how our actions affect the planet.

Then, we must take a step, even if it is a small step, and be committed to making a difference. The “three R’s” are a good starting point, but consider a few more “R’s” for changing the culture of waste in your school division.

Rethink

Ask questions about how you can make changes. How can much of what was garbage before be useful in other ways? How do purchasing patterns add to waste? How does the consumerism we often accept as the norm in our society affect the production of destructive waste in other places on Earth? How does technology reduce waste and contribute new waste? Rethinking leads to imagination, innovation, and action.

Refuse

Refuse to maintain the status quo if something can be changed. Refuse to give up even when others are giving up. Refuse to let obstacles and barriers be anything more than problems to be solved by innovative people like you. Refuse to let garbage be your default—REFUSE (ri-fyooz) refuse (ref-yoos)!

Restore

Restore the practices of the past that have benefitted previous generations and have been good for the environment. Composting organic waste as a means of fertilizing gardens has been practiced in Canada for generations. Restore equipment, furniture, and other items that you and others can use into the future.

Repair

Find out where items can be repaired. Often, one component is damaged while the rest is like new. Bikes that have been repaired are much appreciated by those who cannot afford a new one or by people in other parts of the world.



Recycle

You would think that recycling would be second nature in our society. Surprisingly though, many people still do not take the time to set up collection sites in community centres and parks. Households often recycle the bare minimum, with the rest of the valuable resources going into the trash. Schools have recycling programs but they still need to take frequent audits to ensure that students'/staff's knowledge and practices are up-to-date. Find out what can be recycled in your municipality and maximize your efforts.



Reduce

Reduce the use of consumable goods where possible—buy what you need. Reduce the amount of packaging material and inform suppliers of their need for reduction. Reduce your dependence on products made of non-renewable resources. See www.recycling-guide.org.uk/reduce.html.



Replace

Replace old, less environmentally friendly habits with new ones. See Earth as a sustainable place to live and its inhabitants as people to share it with. Replace items that are destructive to the environment (recycle them) with ones that reduce your footprint. As Annie Leonard says in her Youtube video, The Story of Change, “make sure the right thing becomes the easiest thing to do.” See www.youtube.com/watch?v=oIQdYXCKUv0&safe=active.



Reuse

When an item can be reused instead of tossed, it does not end up in a landfill and more resources are not being consumed to replace it. Sealable bags and other containers can be reused for months in lunches. Let's break the cycle of buy, use once, and toss out. A music class at Blumenort School discovered the treasures in the landfill to build a “Recycled Orchestra.” See <http://steinbachonline.com/local/41068-blumenort-schools-own-qrecycled-orchestraq>.



Repurpose

If something cannot be used again for its original purpose, repurpose it. Landmark Elementary School (LES) repurposed over 500 pop cans to make a pop can solar heater for their greenhouse. A discarded restaurant sign became material to build a box for batteries in a solar-powered system. For fun, create “garbage fashion” and have a fashion show. Upcycling can repurpose juice pouches into a lunch bag. If you don't want to send it away for others to repurpose, then do it yourself. Technical Education departments at schools could take on the challenge of repurposing and selling items.

Redesign

If the current version is good but could be better, redesign it. Redesign systems, practices, and spaces to maximize waste reduction. Redesign content in your daily lessons to incorporate examples, discussions, media, guest speakers, and field trips that enable you to teach, learn, and model for a sustainable future.

Re-sign

Put up signs in your schools that inform people and direct them toward the desired action. Make sure compost collection bins and recycling bins are clearly marked and located in convenient locations. (See appendices J, K, L, M, N.)

Respect

Respect Earth, our shared living space. Batteries, dry cells, fluorescent lights, and chemical waste are just a few of the materials that can contaminate groundwater around a landfill so avoid throwing these out and look for alternative disposing and recycling methods. Respect people's tolerance for change. The "policing a policy" approach may get short term compliance in a given space. Change that is sustainable must include a system-wide plan for sustainable change, as well as knowledge, skills, and a personal challenge to change values and attitudes.

Relate

Through relationships with others and the knowledge and experiences they communicate, our learning and decisions for sustainable action become more personally motivated. Relate your stories of success. Relate stories of challenges and solutions. With positive and encouraging relationships, there is a greater opportunity for the culture of waste to change.

Recognize

Recognize successes and take time to celebrate. Recognize challenges and find ways to problem solve with teams of students and staff. Recognize that the impact of you tossing something in the garbage goes beyond the classroom trash bin.

Reorganize

Reorganize your school division's purchasing practices, waste collection methods, and personnel job descriptions to ensure that new and effective waste reduction strategies do not depend solely on passionate initiators but will be embedded in a system-wide approach to waste reduction for the sustainable future.

Resolve

Resolve to make personal changes and to be part of a collective, sustainable change in the culture of waste. Your ecological footprint describes the negative impact you leave on the planet through the way you live. Your handprint represents the actions you take to minimize your ecological impact on Earth. **Resolve to make your handprint larger than your footprint.**



In the Beginning

In October 2010, Hanover School Division (HSD) organized a professional development event that focused on sustainability. Given the theme of the event, much thought and effort was put into practicing what we were preaching. Compostable servingware was provided for the meal and the only mealtime waste was the plastic packaging from the crackers we ate. Containers for recycling, compost collection, and garbage were positioned in many areas throughout the hosting facilities. Information was posted and explained. It was not perfect, but it gave us all a start toward thinking differently about garbage. The compostable materials, all food waste, compostable servingware and paper towels, were collected in compostable bags and delivered to a sheep farmer (then president of the Manitoba Composting Association) who had agreed to use his agricultural composting windrows as part of our pilot project for industrial composting.

At Landmark Elementary School (LES), where I (Russ Dirks) teach (Grades 5 and 6) and hold an office as a half-time curriculum support teacher (CST) in Hanover School Division, we started a plan to participate in Waste Reduction Week. For one week in October, we took on what we called “the coffee can challenge.” Classes turned their garbage cans upside down and put a coffee can on the garbage can to collect the day’s garbage. At the same time, our teachers talked to their students about other possibilities for the items we would normally throw away. We talked about improving our recycling program (we looked into what was recycled and found out we could be recycling more than what we were at that time), collecting compostable material, and reusing items. After the



HSD’s first industrial composting pilot took place at a sheep farm.



All the food scraps and compostable servingware were buried in a windrow of sheep manure.

week was over, students and staff began to ask why we would not be able to continue with waste reduction throughout the year. And so, our journey began.

LES students and staff worked at setting up an internal system to make the work of waste reduction part of our school culture. We developed “green teams” that would collect the



The coffee can challenge in every classroom at LES

compostable materials and bring them to a central bin with a compostable bag in the school. Students were taught that, any time they walked to a garbage can, they had to make a decision about how they could avoid waste. Compostable materials such as paper towels, nasal tissues, and all food scraps could be tossed into the compostable materials collection bucket that was nearby with a sign listing examples of compostable items. Beside the garbage can was a recycling bin which also had a sign to show all the possible items to be recycled. Green teams and student helpers in

each class made sure that compostable materials were collected each day so that there would not be an odour issue. Some classes chose to use compost collection buckets and others just reused a small pail from home. At this time, we brought our compostable materials to a garden centre in Winnipeg because we had no other industrial composting site that was available locally.

Our goal at LES was to go beyond just sending away compostable materials, never to see the end product again. In August of 2011, we began our “Grow to Give” greenhouse project. We



The coffee can challenge at LES

wanted to build an off-the-grid greenhouse that would enable students to learn about plants and habitats, while incorporating many other curricular outcomes. One of the features would be the use of the compost that had come through our waste reduction efforts. We brought in a bin of compost, started our own backyard composters, and developed a number of vermi-composters in the school. Because of construction delays in the greenhouse, we organized an in-school planting project in the spring of 2012 using the compost sources as part of our soil mix. Although some of the plants grew and could be taken home, the in-school pilot showed us that the greenhouse would greatly enhance our ability to promote local food production with our students. They would all be able

to seed food-producing plants in our compost/soil mixture, nurture the plants and see them grow in the greenhouse, and then take the plants home to transplant them into their gardens. (See the open house event at LES at https://youtu.be/DH1jzK4_DmE.)

We also did a hands-up survey with students and a take-home parent survey to gauge student and parent involvement in recycling, composting, and gardening at home and school. The results showed that about 80% of the families practiced recycling but some were unaware of the full range of items that could be included. About 50% of the families practiced some type of composting at home but because Landmark does not have curbside compostable material pickup, the composting tends to be limited. According to the survey, parents showed interest in knowing more about composting. For that reason, we decided to give our students' parents opportunities to learn more about composting through mini presentations whenever we had school events.



The staffroom at LES models the school's vision for waste reduction.

Gathering the correct information about what can be recycled and composted is very important. People have a lot of misconceptions about what happens to the materials collected. Some individuals believe that everything gets taken to the landfill regardless. Also, recycling practices vary from one municipality to another. In some cases, the practices can change without proper public notification. Making calls to the supervisors at the recycling center and the industrial composting collection areas helped us to clarify changes and misconceptions. A call to the local solid waste management director helped us learn about new initiatives and possibilities. As such, we became aware that an industrial composting site was being developed and would soon be ready to take our school's compostable materials. Several weeks later, we were taking the compostable material we had collected in our school to the new site under a special pilot provision. The director encouraged field trips and was willing to speak to student groups in schools. A call to the local recycler and community councilor also clarified the range of plastics that could be collected for recycling. Many families in the Landmark area were only collecting number 1 and 2 plastics yet the recycler was accepting the full range of plastic containers. By applying a little pressure on the politicians and local municipal personnel, we were able to obtain proper information and send it out to residents. Collecting a broad range of plastics greatly increased the amount of garbage that could be diverted away from the landfill.



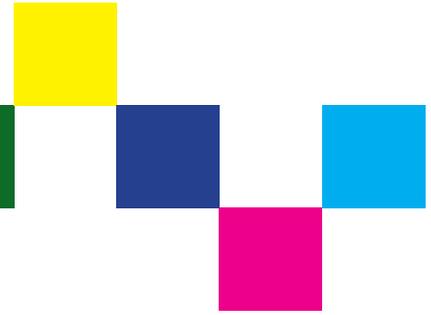
Compostable materials from classes get dumped into a large central collection bin at LES.

By collecting compostable materials and enhancing our recycling efforts, LES was able to reduce its landfill-directed waste by 75% in only a few days. What used to be four full bags taken to the garbage cage each day turned into one bag per day. Our student survey showed that 99% of LES students were recycling at school and 93% were putting items in the compostable material collection containers. Some students, especially in K-3, did not really understand what composting was all about so sessions were made available to classes in the school to help students learn more about composting and recycling, and the way these practices are more sustainable than filling landfills.

HSD superintendents heard about the successes in Landmark Elementary School and soon a meeting was held with the CST for Education for a Sustainable Future (ESF) to talk about a division-wide strategy for waste reduction. Some divisional events were already modeling

waste reduction practices under the supervision of the CST but there was a big gap between what was being preached and what was being practiced in most schools and in the administration office. The goal was to reduce landfill directed waste by 50% in the entire school division over a period of two years. Out of this vision, the Hanover School Division 50% Challenge for Waste Reduction was born. (See Appendix A.)





Information about the 50% Challenge was shared with administrators as a group and in a letter to ESF school leaders explaining the vision. To compile baseline data about current practices as well as waste and recycling bag counts, information was collected using a simple survey (See Appendix B.) done by an administrator or ESF school leader in each of the schools. These figures could later be compared to the bag counts after a school had implemented their 50% Challenge plan.

The Manitoba Government, through the Department of Conservation and Water Stewardship, offers a grant opportunity to community projects focused on waste reduction. Waste Reduction and Pollution Prevention (WRAPP)—see www.gov.mb.ca/conservation/pollutionprevention/wrapp/wrappfund.html—granted \$15 000 to Hanover School Division for waste mitigation initiatives that we were planning on implementing in the 50% Challenge. (See Appendix C.) Schools in Hanover were encouraged to apply to HSD central office for funding to kick-start their waste reduction initiatives. Funding was granted based partly on school population and partly on the need assessed using the criteria for the 50% challenge. (See Appendix D.)

During this time, there were also ongoing discussions with other stakeholders. All local recycling handlers were contacted in order to obtain updated information as well as clarification about the kinds of materials we could recycle in the schools. This information was passed on to schools. Meetings were held with board committees and school administrators to provide them with the overall vision for waste reduction as part of the HSD Education for a Sustainable Future Action Plan. (See Appendix E.) Personnel in the maintenance department were consulted and strategies (See Appendix H and Appendix I.) were put in place so that practices in all buildings in the school division could go from standard waste and low-level recycling, to diligent, well-informed recycling practices and compostable material collection.



Industrial composting facility in Steinbach

Partnership arrangements were made with the City of Steinbach Solid Waste Manager to have HSD compostable materials delivered to their compost windrow which was established to



Students are excited about the way their plants are growing.



LES students grew lettuce in their Grow to Give Greenhouse using a soil and compost mixture.

compost leaves and grass for the city. The compost windrow is stirred up daily to promote aerobic decomposition. Each time divisional personnel deliver to the site, the amounts are weighed so accurate data can be tracked. (See Appendix F.) There are no tipping fees associated with composting at this disposal site. The City of Steinbach recognizes the potential savings from not needing to develop as many future garbage dumping cells. In the spring, they utilize a sifting machine that takes out any non-compostable material. What is left is a nutrient-filled fertilizer for lawns and gardens. Landmark Elementary School students use the compost when they plant vegetables and herbs in their greenhouse in the spring and lettuce in the fall. Other schools and community members are encouraged to take advantage of this free fertilizer. The City of Steinbach Solid Waste Disposal site has also become a field trip location. Tours are given with an emphasis on waste reduction. The City of Steinbach Solid Waste Manager is available to give the on-site tours as well as visit classrooms to talk about the waste reduction practices. See www.steinbach.ca/city_services/sanitation_and_landfill/#battery_disposal.

The Hanover School Division Board gave approval for an in-house, multi-purpose courier to be hired who could pick up compostable materials that schools have collected in compostable bags for delivery to the compost collection area at the City of Steinbach Solid Waste Disposal site. Although some schools had staff volunteering to take the compostable materials to the disposal site, it was not feasible for many schools to do this on their own. Schools presently have a minimum of two pickups per week. With less garbage to be stored for weekly pickup, extra space is available on school sites to store the compostable material before pickup. Until there is a municipal pickup service provided, the transport of compostable



There is more room for compostables as the amount of garbage waste decreases.

materials from each HSD school to the compost windrow at the City of Steinbach Solid Waste Disposal site is a major key to the success of the 50% Challenge for Waste Reduction. Timely removal of compostable material from schools and other HSD facilities helps eliminate issues of unwanted odour, as well as problems with rodents and storage issues.



Compostable material from HSD gets deposited on the windrow at City of Steinbach.

Having a partnership with a supplier that can offer relevant information about compostable products is another key to successful waste reduction. As schools move away from styrofoam and other non-recyclable, non-compostable products, there is a need to have reasonably priced replacements. Suppliers such as Canada Green (see www.cagreen.ca/), offer a wide range of products that are certified compostable for use in school cafeterias, for school/divisional events, and for general compost collection. Canada Green offers school pricing rates and advice pertaining to the use of different products for site-specific applications. Some schools have incorporated the implementation of reusable servingware that can be washed for smaller events. However, for some events within schools or for divisional gatherings, well-informed use of compostable servingware acts as a teaching tool, the modeling of the division's vision for environmental sustainability, and a means to decrease the landfill-directed waste by a significant amount.



If reusable servingware is not available, use compostable servingware.

Education about waste reduction needs to be dispensed formally and informally in every situation possible. Signs should be placed on or near collection containers. Every event held by a school or school division must include a brief orientation about the waste reduction vision and the way in which the event is set up to handle waste reduction. Information about the success of waste reduction initiatives must be communicated to teachers, students, board members, and administrative staff so that results are understood and celebrated. Classrooms are a great place to talk about social, environmental, and economic connections to waste in our society. The curriculum connections are numerous. When a classroom curricular connection is made to the visible waste reduction initiatives being carried out in the school, the impact is multiplied. (See Appendix P.) Even a one-minute "rethinking our garbage" session after lunch can be used as a reminder about where lunch waste can be redirected for recycling or composting.



Every collection area also educates.

Some schools have explored “upcycling” (sometimes called by its brand name, Terracycling), a process in which mostly non-recyclable waste can still be used by manufacturers to produce



Upcycling can be done by sending items to a company like Terracycle or by doing in-school projects.

products for sale. A prime example of this is the use of juice pouches. The juice pouches are sent to a collection company (see www.terracycle.ca) that pays for postage and gives back a small amount of money to a charity or directly to a school. One of the teachers at LES initiated managing the Staples Brigade in our school. It is a Terracycle program that streams all ink pens and markers out of the landfill-directed waste. It just takes a collection strategy (simple and easy) and a willingness to drop off the collected materials at a Staples store. (See www.terracycle.ca/en-CA/brigades/writing-instrument-retail-based-brigade.html.)

Multi-Material Stewardship Manitoba provides free collection bins for recyclable beverage containers through their “Recycle Everywhere” campaign. (See www.recycleeverywhere.ca/) Schools use the bins in hallways, on playgrounds, and at special events. Because of the media



A classroom session about the different types of composting

advertising already associated with Recycle Everywhere, it is easy for schools to make the connection to programs in the community. In some cases, the use of these containers in the school prompted community clubs and arenas to implement recycling within their own facilities.

As a Curriculum Support Teacher (CST) for Education for a Sustainable Future, I have opportunities to meet with teachers, administrators, and students in classrooms. I see schools taking up the challenge of reducing waste and individuals within these schools have a desire to inform students and staff. Presentations about composting, what happens at a landfill operation, and the myths and challenges surrounding waste, recycling, and composting (see <http://greenactioncentre.ca/>) give the teachers and students opportunities to assess and present practices and plan for improvements in their classrooms and schools. In some schools, teachers have begun to set up vermicomposters. Although this type of composting with containers of red wiggler worms handles a very small percentage of the overall compostable material from a school, it is a helpful teaching tool to demonstrate the organic interaction of compostable materials and the environment. It is visible, practical, and fun for many students. Later, the worm droppings can be separated from the worms and mixed in with soil as a fertilizer for growing plants at school or at home.



Sustainable Waste Minimization

Great vision, start-up funding, and initial enthusiasm often get lost in the process of establishing a culture for change and, as a result, the change is not always sustainable. Implementing change takes hard work, determination, planning, action, changing of old mindsets, and much patience. For waste minimization to be sustainable, it must be supported at all levels of a school division. This type of support takes time and is nurtured through collegial relationships. School custodians should be consulted for their expertise in solving the logistics of waste reduction instead of just being informed that they will do things differently. School administrators and sustainability leaders need to support change rather than merely mandate change. Superintendents are generally enthusiastic about taking on waste reduction but may lack the time to administer the process.

The following is a list of key steps to be considered when putting together a divisional plan that will incorporate a system-wide approach:

- 1.** Together with the superintendents, select an individual in the school division that will be able to communicate the vision of waste reduction at all levels. This person needs to be collegial to draw in the expertise of others in the school division.
- 2.** Establish a goal and plan for waste reduction. (See Appendix A and Appendix G.)
- 3.** Present the plan/proposal to key maintenance personnel, superintendents, and board members for input.
- 4.** Establish Education for Sustainable Development leaders in each school who will be the catalysts for change in each facility (e.g., administrators, teachers, and students). See the Guide for Sustainable Schools in Manitoba for strategies at www.edu.gov.mb.ca/k12/esd/pdfs/sustainable_guide.pdf.
- 5.** Develop staff/student teams in each school (include the custodial staff in your consultation) to plan implementation strategies. (See Appendix H.) Teams help make the actions sustainable. You need to ask the question, “If the leader leaves the school, will the sustainable action continue?” A classroom team at Clearspring Middle School in Steinbach, Manitoba found a strategy that made compost collection part of the daily routine. See <http://www.steinbachonline.com/local/41002-compost-isnt-too-cool-for-hsd-schools>.

6. Get students involved in finding solutions and implementing them.

7. Consult with municipal waste facility personnel, recycling directors, and so forth, to keep up with the latest information regarding what each municipal facility will accept. This can change from time to time without the public's knowledge. Some web sites are outdated. In the Winnipeg area, the Winnipeg 311 website is a valuable resource. See <http://winnipeg.ca/waterandwaste/garbage/refGuide/default.stm>.



Compostable servingware is available through local Manitoba vendors.

8. Inform all facilities in your school division about which materials can be recycled, upcycled, and composted in your municipality. (See Appendix I.)

9. Establish baseline data by determining the number of bags of garbage (the standard size used in the school division to collect garbage) that usually get thrown out each week (before starting a waste reduction plan). (See Appendix B and Appendix C.)



10. Consider implementing your plan during "Waste Reduction Week," a national campaign promoted in October of each year. See www.wrwcanada.com/.

11. Consider all school and divisional events as opportunities to model the waste reduction initiative. Consult with divisional personnel who plan large events so that the purchasing of materials and collection of waste fit together with the waste reduction plan.

12. Eliminate non-compostable items for school events/food service (including cafeterias and breakfast programs) and purchase compostable products and/or use servingware that can be reused.



Make a sign that informs.

13. Place a recycling collection bin near every garbage can and a compostable material collection bin wherever paper towels are used and food is eaten, as well as in washrooms with paper towels used for hand drying.
14. Consider creating student groups, classroom groups, or ESD leaders to initiate upcycle collection programs. See www.terracycle.ca/en-CA/brigades.html.
15. Establish protocols for collection of batteries. Some cities and municipalities provide drop-off sites. See <http://winnipeg.ca/waterandwaste/recycle/howToRecycle.stm#autoparts>.
16. Create appropriate signage. (See appendices J, K, L, M, N.)
17. Keep Parent Councils informed so that events that they initiate follow the waste reduction plan.
18. Use every event as an opportunity to educate and inform. (See Resources and Links.) Remember to include practical instructions and signs for people at events and to remind students in classes.
19. Use compost from industrial composting facilities, vermicomposters, and backyard composters to model the natural and environmentally friendly cycle involved in composting to add to soils for growing plants at school and home.
20. If you are unable to access industrial composting facilities, maximize all other strategies for waste reduction, and meet with local politicians and petition for change.
21. Use every opportunity in the classroom to tie together curriculum with waste reduction initiatives.
22. Audit your waste reduction by collecting data from schools and other divisional facilities on a yearly basis. (See Appendix R.)
23. Inform your communities about your successes and celebrate together. Media outlets are interested in stories that involve student initiative and collaborative action.



Worms do the work in a vermicomposter.



A backyard composter can be used during all seasons.



Compost from an industrial composting site is ideal for mixing with soil to grow plants.



Learning about the content of garbage ties in well with learning about matter in science.



Students love to help build vermicomposters.



A student garage sale creates interest in reusing and can easily become a fundraiser and a math activity.

For example, Elmdale School in Steinbach shared their story about how they were working on reducing waste.

Elmdale School has reduced its garbage by more than 50 per cent through composting lunch and snack waste. We are starting to compost paper towels from the bathrooms and expect a substantial decrease in garbage through this initiative. Several assemblies have been organized by our committee to help promote composting and recycling school wide. One class uses a vermicomposter which is an excellent way to show composting in nature. As well, we have a transparent plastic composter which is used to demonstrate how some items compost faster than others. We are in the process of setting up a garden. Last year we were awarded a grant which enabled us to purchase many of the materials we needed. We purchased a turbine composter which will be used to show students how their food gets turned to compost which can be used in gardens and continues the cycle. Several times per year classes clean up the playground and surrounding area. We have also posted "Idle Free" signs in the school parking lots to remind motorists that our school is an Idle Free Zone. An EA at our school is an expert on bees. He has done several presentations in classes describing how life cycles are interdependent, and how our behaviour affects our environment. Blue box recycling continues at Elmdale School.

Melissa Fry – Teacher at Elmdale School

In Landmark School, we hosted a grand opening for our greenhouse and used the opportunity to teach and practice the collection of recyclable and compostable materials and the use of compost to grow plants. At the event, we collected e-waste, large appliances, and batteries from the community to demonstrate the way in which these items can be recycled. We got the event team from Recycle Everywhere to do activities with students and community visitors. We displayed the gardening plants that all the students from LES were growing in the greenhouse. The vegetables and herbs were growing in a mixture of soil and compost that came from the industrial composting site Hanover schools had been contributing to over the last year. Parents and their children were given an opportunity to seed new plants together that could grow in the greenhouse and later be taken home. We demonstrated the use of backyard composters and vermicomposters. Student ambassadors



Students washing pop cans so they can be repurposed for a pop can solar heater.



The pop cans were glued together to make convection columns in the pop can solar heater.

gave tours to our guests to highlight the reuse of pop cans and other building materials that were repurposed for two large pop can solar heaters that extend our growing seasons in our off-the-grid, “Grow To Give” greenhouse. They showed how repurposed plastic barrels and shipping pallets formed part of the structure for a heat sink unit that can store heat during the day and release heat within the greenhouse during the cool nights of the growing season.

At Steinbach Regional Secondary School, a teacher working with students in an alternative education program has been fixing bicycles that are donated or rescued from landfills. The bikes are donated to others or used by students who need them.

All Hanover schools have begun initiatives to reduce waste at their facilities. Each school faces its own unique challenges. As adults, we may find it difficult to change; however, for younger students, the change may be easier as they trust the adults in their schools and want to take on the challenges together with those adults. (See Appendix Q.) Older students can find the convenience of throwing everything in one trash container difficult to resist. Custodians have routines that will need to be adjusted and they may be concerned about



The pop cans are painted black and put in a sealed cabinet.

odours, fruit flies, and storage. School staff members may find that this change is just being added to the plethora of other changes they are being asked to make. There may be myths and even legitimate criticisms of how recycling and composting are handled after they leave the school facility. A municipality may not offer a facility for industrial composting. School divisions may need to budget for change. All of these challenges



Old plastic barrels are used to make a heat sink in the LES Grow to Give Greenhouse.

and barriers (and others that may occur) are real and need to be addressed and even welcomed. This is part of the educational process that goes with changing the culture of waste. Everyone can participate in the journey and each challenge leads to imagination, innovation, and action.



The pop can solar heaters at the back of the Grow to Give Greenhouse at LES collect heat during the day and pump heat into the heat sink units so that temperatures in the greenhouse are moderated during the cool nights of the growing season.



Why Change?

One of the greatest challenges to change is knowing about and being convinced of the “WHY?” for waste reduction. Although informational “facts” vary from source to source, trends, research, and the experience of innovators should motivate us toward change.

- ◆ “In the past century, as the world’s population has grown and become more urban and affluent, waste production has risen tenfold. By 2025 it will double again. Rubbish is being generated faster than other environmental pollutants, including greenhouse gases. Plastic clogs the world’s oceans and rivers, causing flooding in developing-world cities. Solid-waste management is one of the greatest costs to municipal budgets.”

www.nature.com/news/environment-waste-production-must-peak-this-century-1.14032

- ◆ “As urbanization increases, global solid-waste generation is accelerating. In 1900, the world had 220 million urban residents (13% of the population). They produced fewer than 300,000 tonnes of rubbish (such as broken household items, ash, food waste and packaging) per day. By 2000, the 2.9 billion people living in cities (49% of the world’s population) were creating more than 3 million tonnes of solid waste per day. By 2025, it will be twice that—enough to fill a line of rubbish trucks 5,000 kilometres long every day.” (*That is approximately the distance across Canada.*)

www.nature.com/news/environment-waste-production-must-peak-this-century-1.14032

- ◆ “Solid waste – the stuff we send down our chutes, discard at work and put on the curb every week—is a striking by-product of civilization. The average person in the United States throws away their body weight in rubbish every month. When waste management works well, we give it little thought: out of sight and, usually, quickly out of mind. Discarded materials are collected, some are recycled or composted, and most are landfilled or incinerated. But the global view is troubling.”

www.nature.com/news/environment-waste-production-must-peak-this-century-1.14032

- ◆ Garbage takes a long time to decompose in the environment. A glass bottle will last 1 million years; an aluminum can, 80–200 years; a styrofoam cup, 50–500 years; and newspaper, 6 weeks. (See Appendix P.) When these items are put in a landfill, depending on factors such as amounts of heat, moisture, oxygen, and exposure to sun, decomposition rates slow significantly. Readable newspapers that are 25 years old have been found buried in landfills. The anaerobic (without oxygen) state of most garbage, often packed in double plastic bags and buried in layers of clay, will result in very slow decomposition and release of methane gases.

http://greenliving.lovetoknow.com/How_Does_Recycling_Affect_the_Environment

- ◆ Many items that typically go in a garbage container have been used by the consumer for only minutes or seconds (aside from the storage time). A garbage can is THE END for a product's use but its negative affect on the environment may continue for years to come. Recycling and composting continue the cycle of use for years and years with less negative effects on the environment.



It's easy to recycle.

- ◆ Recycling reduces the demand for mineral extraction and the energy required for manufacturing product from virgin sources. Recycling reduces costs for production. Recycling reduces environmental issues related to landfills: pollutants leaching into soils, methane gas emissions from anaerobic paper decomposition, and increased demand for landfill space.

http://greenliving.lovetoknow.com/How_Does_Recycling_Affect_the_Environment

- ◆ "Biodegradable material such as food waste constitutes approximately 40% of the residential waste stream in Canada, therefore diversion of organic materials is essential to reach high diversion targets. The environmental benefits of diverting organic materials from landfill include reduced methane emissions (a potent greenhouse gas) and decreased leachate quantities from landfills. From a life cycle perspective, other benefits, such as the production of valuable compost and renewable energy, can also be derived from the diversion of organic materials from disposal depending on the processing method selected."

www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=3E8CF6C7-1

- ◆ Compostable material collection methods are often criticized because of perceived odour and seasonal fruit fly invasions. People forget that everything thrown into a compost collection container would have been thrown in the garbage where the same issues can exist if not properly handled. Just like garbage, organic matter must be removed from rooms on a daily basis and stored in an enclosed space to avoid excessive odour and fruit fly invasion.
- ◆ An industrial composting facility can handle all food waste and compostable materials such as hand-drying paper towel and compostable servingware (made of organic materials such as paper and polylactic acid from corn). Over a period of 13 months, Hanover School Division diverted 10.2 tonnes of organic waste from the landfill. Appendix G shows the beginning of their 50% Challenge for Waste Reduction.
- ◆ Organic waste in an industrial composting facility will breakdown within days because of the aerobic (with oxygen) decomposition within a windrow (the windrow is stirred up on a daily basis) that has adequate moisture content and because of the resulting heat produced from decomposition. In many cases, the compost is available free of charge to the public.
- ◆ If an industrial composting facility is not available, consider an alternative. Except for paper towels, compostable servingware, and meat and dairy products, almost all organic waste can be diverted using backyard composters and vermicomposters. Compost can then be used for school, community, and home gardening. One school gave their organic matter to a local free-range chicken farmer. In rural areas, agricultural composting is common. Find a farmer who will engage in a pilot program to take your organic waste. School divisions could manufacture or purchase a mechanical composter that could be used to handle the compostable materials from their facilities.



An open pail or a carbon filtered compost collection container can help students make the right choice.



Finished compost is available for pickup at industrial composting sites.



- ◆ Be aware of the terms “biodegradable” and “oxodegradable.” According to Howard Whatman at CanadaGreen, a supplier of compostable products, some biodegradable products are truly compostable but others are not. He says that some biodegradable and all oxodegradable products use a bonding chemical that allows for plastics to break down into small pieces that will disappear into the environment over time. These plastics actually do not decompose and cannot be recycled. The tiny pieces of plastic easily find their way into the food chain.
- ◆ The use of a BIOvator (a mechanical composter), such as the one employed by the Seven Oaks School Division, shows the kind of innovation that can help school divisions reduce their landfill-directed waste. Read their inspiring story at www.winnipegfreepress.com/our-communities/times/Seven-Oaks-letting-nothing-go-to-waste-179130551.html.



Myths and Realities

Sifting through the myths and realities of waste reduction is constantly part of the journey. It takes an open ear to the community (including the students and parents connected to your school) to be aware of the myths. Communication with frontline workers in waste and recycling management is also needed to learn the realities.

One common myth is that most recycled materials end up at the landfill anyway so there is no point putting in the effort to recycle. It is true that compressed bales of recyclable material can end up at a landfill. This is not because recycling programs are just a big conspiracy for appearing “green.” It is because recyclable materials are often contaminated and, therefore, it is not economically feasible for them to be shipped to the processor. For example, when food and liquid waste is spilled on to other items in a recycling bag, the materials will not be sorted and it all becomes garbage. Schools need to be aware of this reality so that the bags of recyclable material getting picked up each week do not end up in a landfill. In addition to contaminated material, a lot of non-recyclable material also gets put in blue boxes and recycling bags. Plastic grocery bags, plastic packaging without a recycling symbol, food waste, e-waste, and even compostable servingware cannot be recycled through Manitoba recycling programs that do residential and commercial pick-up (including schools). All of these additional materials get sorted out of the recyclable material and will end up at a landfill. By finding alternative means to stream items that cannot go to the recycler, you help to keep landfills from needing to expand as quickly.

Another myth is that school cafeterias cannot afford to use compostable servingware. The reality is that the cost of compostable servingware is coming down. Styrofoam may be cheaper in the short term but has a greater negative impact on the environment. See www.livestrong.com/article/159954-facts-about-landfill-styrofoam/. (This is a good topic for investigation by senior years chemistry students). By informing the students of the environmental reasons for making a change, increasing the cost per unit of food sold will not be as hard for them to accept. People are often more open to change and the cost associated with change if they understand the process and are helping drive the change.



Schools and school divisions that have converted to the use of compostable servingware need to take their actions one step further. Compostable servingware used at an event needs to be composted instead of just thrown in the garbage. Like all other compostable materials in a landfill, this material will break down slowly in the anaerobic environment of landfill layers and give off methane gas, one of the more potent greenhouse gases. All the effort that goes into making an event a model for environmental sustainability is lost if the servingware that already cost a bit more just ends up in a garbage dump instead of an industrial composting facility.

Sorting out myths and realities can be an eye-opener for students. Some students are convinced that their actions are already sufficient. A simple “garbology” session can start the discovery process. Pre-measure and then dump a bag of typical school garbage on a tarp in the classroom. Using volunteers with gloved hands, sort through the trash to see how much of it could be reduced, reused, recycled, and upcycled. Then, drive home the point further by digging for what could be composted. Measure it all after separation to see what is left that will need to be taken to a landfill. Your students will become aware of the realities of their tossing habits and you will be integrating the math and science curriculum at the same time.

We are all part of the problem and the solution involves more than just minimizing garbage waste. It involves our habits as consumers, as well as the manufacturing waste produced in countries with developing economies. There is also resource waste connected with transportation methods and distances. We have a lot to think about; however, taking one small action to reduce waste can be the start of the multiplication of action when replicated by many. Just get started!

Since the writing of this document, a few things have occurred that show growth in the waste reduction story at Hanover School Division. The custodian at Landmark Elementary School noticed that garbage bags that did not contain additional compostable waste did not need to be changed as often because the waste was dry, non-odorous, and greatly reduced. As a result, he rescheduled the frequency for changing trash container bags. The multiplied savings over a year in one school are substantial and when further multiplied through the implementation of this practice in many schools, a significant saving will be realized by the school division.

Hanover School Division has also begun to imbed the purchasing of waste reduction materials into the maintenance system so that continued implementation of waste reduction strategies does not rely on personnel that initiated change and other staff that may come and go but, rather, on the practices now in place on a system-wide basis.



Helpful Resources and Links

Bag Up Manitoba—For information about the collection of plastic bags see www.takepride.mb.ca/?pid=73.

Biodegradable Products Institute—This research organization provides a comprehensive site that gives information about compostable products and updated research related to composting practices. Go to www.bpiworld.org/.

Brady Road Landfill—Classroom field trips are available with an emphasis on solid waste and composting. Contact the supervisor of disposal at 204-986-4779. For information and a video tour go to www.winnipeg.ca/waterandwaste/garbage/bradyroad.stm.

City of Steinbach Solid Waste Management—Tours of the facility are available. Call Eldon Wallman at 204-346-6532 or email him at ewallman@steinbach.ca. See www.steinbach.ca/city_services/sanitation_and_landfill/#battery_disposal.

Canada Green—This is a supplier for compostable servingware (as well as other products). This company also offers helpful information. See www.cagreen.ca/.

Green Action Centre—This organization provides information and access to guest speakers on the topic of waste reduction. See <http://greenactioncentre.ca/>.

Guide for Sustainable Schools in Manitoba—This is an online guide to help strategize for change in your school division. See www.edu.gov.mb.ca/k12/esd/pdfs/sustainable_guide.pdf.

Manitoba Composting Association—With a focus on agri-composting, this organization provides information and contacts. See www.compost.org/English/PDF/WRW_2014/MB/G_Dube_MCAC_Compostages_Overview_MCAC_Activities.pdf.

Multi Material Stewardship Manitoba—This organization provides information about container packaging and paper recycling. See <http://stewardshipmanitoba.org/>.

Recycle Everywhere—Get free bins and promotional materials from this organization. See www.recycleeverywhere.ca/.



Recycle Manitoba—For help in finding collection sites for materials that should not be put in a landfill, go to www.recyclemanitoba.ca/.

TerraCycle Brigades—For information and locations for upcycling many products, go to www.terracycle.ca/en-CA/brigades/writing-instrument-retail-based-brigade.html. To print a poster for your workspaces, go to http://s3.amazonaws.com/tc-ca-stage/download_resource/downloads/472/Staples%20Brigade%20Accepted%20Waste%20Poster.pdf. To view other TerraCycle opportunities, go to www.terracycle.ca/en-CA/brigades.html. Note that the postage is free for this program and that some of the products sent in will enable you to earn money for your school.

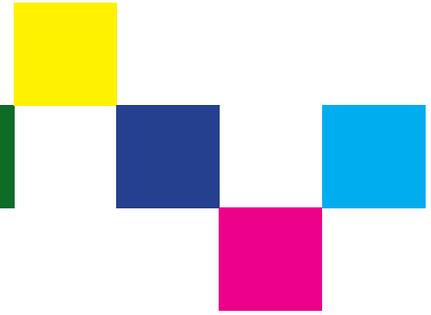
“The Story of Stuff” and “The Story of Change” (You Tube)—View the videos aimed at middle and senior years students at www.youtube.com/watch?v=gLBE5QAYXp8&safe=active. There is a whole series from, “The Story of Stuff Project” presented by Annie Leonard on You Tube that is excellent for use in schools.

The Story of Stuff by Annie Leonard—This is a good book to read to get some background context pertaining to waste on the planet.

Waste Reduction Week—Find a way to get started by going to www.wrwcanada.com/.



Appendices



A P P E N D I X A

The Hanover School Division “50% Challenge”

Vision: Rethink, refuse, restore, repair, recycle, reduce, replace, and reuse to teach, learn, and model for a sustainable future.

The 50% Challenge is a division-wide initiative to reduce all landfill-directed waste by 50%. In October 2010, a pilot project was implemented in Landmark Elementary School which reduced waste by 75% through increased recycling and industrial composting efforts. As a result, targeted actions that could be accomplished in all division facilities were identified and these were included in an Action Plan for Education for Sustainable Futures in Hanover School Division (HSD).

To reach the goal of 50% reduction in landfill-directed waste, divisional facilities will enhance recycling measures, increase the use of compostable materials (servingware, etc.), develop a system of compostable material collection (food waste, paper towels, etc.), and educate all stakeholders and communities about their actions. HSD will collect and transport compostable materials to a local industrial composting site. Schools that are developing greenhouses, community gardens, and other growing projects will, along with the general public, have access to the finished compost material, free of charge. Some schools have and will further develop on-site vermicomposters and backyard composters to use as educational tools and for an on-site source of compost for small projects. *Refuse Refuse: A Guidebook for Waste Reduction in Manitoba Schools* has been written so that the waste reduction process can be replicated in other schools in the province. (The present guidebook is one of the documents that was prepared during the implementation process which was generously funded by Manitoba Education and Training.)

Our partners in the 50% Challenge include the City of Steinbach—Solid Waste Management; Manitoba Education and Training—Education for Sustainable Development; and Canada Green Natural Products. The City of Steinbach has a newly developed industrial composting area in their solid waste management site. Staff there receive the compostable materials (no fee), track the weight upon reception, are involved in educational activities and community promotion, release finished compost for use in school and community programs (no fee),



and act as consultants. The personnel at Manitoba Education and Training—Education for Sustainable Development provides consultation for curricular development and the guidebook, as well as assistance with other programming initiatives. Canada Green (see www.cagreen.ca/) has provided, and will continue to provide, assistance with favourable product pricing, product research data, and consultation for facility-specific applications.

We believe this project has potential benefits for the environment, community, and economy. Our project will address known environmental concerns with unwanted greenhouse gas emissions, changing the culture of waste, and promoting the three areas for sustainability: the environment, human health and well-being, and the economy. In the April 5, 2012, issue of the local newspaper, *The Carillon*, the headline reads, “Less waste winds up in landfill.” Our partner at City of Steinbach—Waste Management, Eldon Wallman (City of Steinbach Solid Waste Manager), in an interview for the article, points out that, “compost waste produces methane gas,” which he explains is very harmful to the environment. “It’s the worst waste that comes in.” (Judy Peters. *The Carillon*, April 5, 2012.)

At HSD, we believe that our project will educate both our students and the community at large and encourage them to work together toward environmental sustainability and community action. Economic benefits will be realized as the landfill sees a continued decrease in tonnage tally of garbage from the current 4% per year decrease rate. (*The Carillon*, April 5, 2012.) The City of Steinbach hopes to have curbside compost pickup in place sometime next year (this was implemented in limited areas of Steinbach in the fall of 2013) and Hanover School Division will endeavour to lead the way with the sustainability initiatives in our project. What we do at the school level will have far-reaching effects for years to come in our homes and communities. The aim is to continue this project on a long-term basis.

Goals and Objectives:

1. Decrease landfill-directed waste by 50% in Hanover School Division by June 2014.
2. Increase the amount of recyclable materials (that were previously recyclable but were bound for the landfill) collected in Hanover School Division (batteries, number 1-8 plastics, juice boxes, etc.).
3. Change the culture of waste in Hanover School Division by supplying alternative materials (compostable/recyclable/reusable) to be used in all facilities by June 2014 (ie., discontinued use of Styrofoam and other non-compostable or non-recyclable servingware).
 - Recycling—enhanced through education, signage, and collection
 - Reusing—“litterless lunches,” exchange programs, garage sales, etc.
 - Composting—industrial composting (pickup service will be made available to HSD schools), vermicomposting, and schoolyard composting; schools can typically collect the following for industrial composting programs: paper towels, facial tissues, napkins, all food waste, and compostable servingware
 - Garbage as a last resort—only non-recyclables, non-compostables, and non-reusables



Baseline Data Collection Letter to Schools

As part of the Hanover School Division (HSD) Education for a Sustainable Future (ESF) Action Plan, Randy Dueck (Superintendent of HSD) has commissioned me (Russ Dirks) to oversee a very simple audit of garbage and recycling in preparation for the HSD 50% Challenge that will begin in September of 2012. The 50% Challenge is a division-wide initiative to reduce landfill-directed waste by 50% over the next two years. The current audit is necessary for us to measure our success and will also assist us in reporting data to the agencies from which we receive grant money. In the near future, more information about the plan will be shared with administrators. Keep in mind that school personnel will be given assistance through the school division to make this possible in your school/facility. If you have already initiated major waste reduction actions in your facility, then please give data that reflects your pre-initiative amounts so that fairly accurate baseline data can be collected (*and please comment on the details of your initiative*).

Administrators, facility staff, and ESF school leaders, please get the assistance of your custodians to gather the following data. Once you have this data, please fill in the section below and reply to the email.

Data Detail Required

Name of School/Facility: _____

Date: _____

School/Facility Population (including all staff:
(teachers, administrative personnel, EA's, custodians, etc.): _____

The average number of garbage bags per week at your facility: _____

The average number of recycling bags per week at your facility: _____

Comments/questions: _____

Russ Dirks
Hanover School Division
Curriculum Support Teacher: Education for a Sustainable Future



Waste Reduction and Pollution Prevention (WRAPP) Fund Application

The Hanover School Division (HSD) 50 % CHALLENGE

Learning about Our Organization

Our Mission: “Hanover School Division is a student-centered school division striving for excellence while developing skills and promoting values for a productive and wholesome life.”

We believe: “that learning truly matters; that teachers teach students and not subjects; that no significant learning occurs without a significant relationship; that every student every day of the school year, in every class deserves challenging, engaging, and imaginative “work” to do; that students involved in self-assessment are more engaged in their learning.”

HSD is the 7th largest school division in the province and the largest outside of Winnipeg. We have an annual budget of over \$57 million. We are comprised of 17 schools (18 as of Fall 2012) with over 7,400 students and more than 1,000 staff.

Project Manager/Contact:

Russ Dirks

Curriculum Support Teacher for Education for Sustainable Futures in
Hanover School Division

Landmark Elementary School

177-2nd St. East

Box 260

Landmark MB R0A 0X0

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Fax: 204-355-4360

Email: rdirks@hsd.ca

Alternative Contact/Grant Recipient:

Randy Dueck

Assistant Superintendent, Hanover School Division

Hanover School Division Administration Office

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Fax: 204-326-9901

Email: rdueck@hsd.ca



One area of growth in Hanover School Division is Education for Sustainable Futures. The 50% Challenge is one way that we are making visible changes in waste reduction in all our facilities that lead to learning opportunities for everyone. For more comprehensive information about Hanover School Division, including its history, board members, and philosophy go to www.hsd.ca/.

Project Description

The 50% Challenge is a division-wide initiative to reduce all landfill-directed waste by 50%. Since October 2010, a pilot project has been in effect in Landmark Elementary School. That school has reduced its waste by 75% through increased recycling and industrial composting efforts. As a result, targeted actions that could be accomplished in all division facilities were identified and these were included in an Action Plan for Education for Sustainable Futures in HSD.

To reach the goal of 50% reduction in landfill-directed waste, divisional facilities will enhance recycling measures, increase the use of compostable materials (servingware, and so on), develop a system of compostable material collection (food waste, paper towels, and so forth), and educate all stakeholders and communities about their actions. HSD will collect and transport compostable materials to a local industrial composting site. Schools that are developing greenhouses, community gardens, and other growing projects, along with the general public, will have access to the finished compost material, free of charge. Some schools have and will further develop on-site vermicomposters and backyard composters to use as educational tools and for an on-site source of compost for small projects. A guidebook for other school divisions in the province will be written so that this entire process can be replicated.

Our partners in the 50% Challenge include the City of Steinbach—Solid Waste Management; Manitoba Education and Training—Education for Sustainable Development; and Canada Green Natural Products. (Letters of support are included in this application.) The City of Steinbach has a newly developed industrial composting area in their solid waste management site. They will receive the compostable materials (no fee), track the weight upon reception, be involved in educational activities and community promotion, release finished compost for use in school and community programs (no fee), and act as consultants. The personnel at Manitoba Education and Training—Education for Sustainable Development will provide consultation for curricular development and the guidebook, as well as assistance with other programming initiatives. Canada Green has and will provide assistance with favourable product pricing, product research data, and consultation for facility-specific applications.

Meeting the WRAPP Fund Program Criteria

Hanover School Division's 50% Challenge will focus on the priority to "model integrated waste management system development and planning." To accomplish this task, we will develop a system of waste management in our school division that increases recycling, diverts organic matter into compostable collection containers at each facility, and provides



transportation of that material to the industrial composting facility at the City of Steinbach—Waste Management site. Each divisional facility will focus on the use of compostable products (green procurement) to replace products that were previously destined for a landfill. Schools conducting in-house projects with vermicomposting and backyard composting practices will be able to further decrease waste.

Beginning in October 2010, Landmark Elementary School implemented a pilot project for waste reduction which enabled them to achieve a 75% reduction in waste. By conducting pre-project and post-project waste audits, we will determine if our waste management system will meet or exceed our goal of 50% reduction in waste at each HSD facility.

Our partnerships with City of Steinbach—Solid Waste Management; Education Manitoba—Education for Sustainable Development; and Canada Green will give us continued consultation assistance, educational opportunities, and practical help needed to accomplish our goal. Together with these partners, we envision the development of a guidebook to assist other local governments and school divisions to adopt similar systems and plans for waste reduction.

We believe this project has potential benefits for the environment, community, and economy. Our project will address known environmental concerns with unwanted greenhouse gas emissions, changing the culture of waste, and promoting the three areas for sustainability: the environment, human health and well-being, and the economy. In the April 5, 2012, issue of the local newspaper, *The Carillon*, the headline reads, “Less waste winds up in landfill.” Our partner at City of Steinbach—Waste Management, Eldon Wallman (City of Steinbach Solid Waste Manager), in an interview for the article, points out that, “compost waste produces methane gas,” which, he explains, is very harmful to the environment. “It’s the worst waste that comes in.” (Judy Peters. *The Carillon*, April 5, 2012)

At HSD, we believe that our project will educate both our students and the community at large and encourage them to work together toward environmental sustainability and community action. Economic benefits will be realized as the landfill sees a continued decrease in tonnage tally of garbage from the current 4% per year decrease rate (*The Carillon*, April 5, 2012). The City of Steinbach hopes to have curbside compost pickup in place sometime next year (this was implemented in limited areas of Steinbach in the fall of 2013) and Hanover School Division will endeavour to lead the way with the sustainability initiatives in our project. What we do at the school level will have far-reaching effects for years to come in our homes and communities. The aim is to continue this project on a long-term basis.

Detailed Project Description

Goals and Objectives:

1. Decrease landfill-directed waste by 50% in Hanover School Division by June 2014.



2. Increase the amount of recyclable materials (that were previously recyclable but were bound for the landfill) collected in Hanover School Division (batteries, number 1-8 plastics, juice boxes, etc.).
3. Change the culture of waste in Hanover School Division by supplying alternative materials (compostable/recyclable/reusable) to be used in all facilities by June 2014 (ie., discontinued use of Styrofoam and other non-compostable or non-recyclable servingware).

Project Work Plan

- a) Time Frame: September 2012 to June 2014 (for initial implementation)
- b) Activities
 - Presentation to school administrators: Spring 2012
 - Waste/current recycling audit: Spring 2012
 - Meetings with HSD Department Heads: Spring 2012
 - Establish collection strategy in each facility: May to November 2012
 - Order collection bins and compostable servingware: Spring 2012
 - Distribution of collection bins and compostable servingware to HSD facilities: Summer/Fall 2012
 - Begin weekly pickup schedule for collected compostables from HSD facilities for delivery to City of Steinbach—Solid Waste Management site: September 2012
 - Begin in-school educational activities to promote waste reduction and waste-reduction strategies: September 2012 to June 2014
 - Fieldtrips to Solid Waste Management site and presentations by the department head: September 2012 to June 2014
 - Guidebook development: January 2013 to June 2014
 - System evaluations January and June 2013 and 2014 with final data compilation in June 2014.
 - Celebration events for HSD facilities reaching the goals of the 50% Challenge: June 2013 and 2014
- c) Resources (Materials, Supplies, and Equipment) Required
 - Truck (to be used about 13 hours per week)
 - Small, room-specific compostable material collection bins
 - Central compostable material collection bins
 - Compostable bin liners
 - Compostable servingware
 - Celebration banners



- d) Community Involvement
- We will be inviting our communities to join in the initiative by reducing waste in their homes.
 - Schools will be encouraged to highlight their involvement in the 50% Challenge at school events and Parent Council meetings.
- e) Project Management and Personnel
- Russ Dirks will be responsible for managing the project and overseeing the implementation of the goals and timelines together with the Maintenance Department Head of HSD
 - Project management will include a team planning approach with the Maintenance Department Head and Randy Dueck, Assistant Superintendent for HSD, who will also be overseeing the disbursement of funds and the relevant bookkeeping. Team meetings to develop the system strategies and to assess efficiency will be conducted. Building staff will be given instruction regarding collection and storage methods. A truck driver will be given in-servicing regarding pick-up and delivery scheduling and material handling.
- f) Target Group(s)
- This project will mainly serve the student and staff communities in each of the facilities of HSD. As parents and visitors enter our facilities, we hope they will be inspired by the vision for waste reduction.
 - We also envision our communities of homes and businesses taking on the challenge as well.
- g) Communication, education, and awareness
- Communication regarding the kickoff and achievements for this initiative will be released to local media (The Carillon, Steinbach Online, Mix 96, etc.) and through school newsletters and websites.
 - As each facility hosts events, the 50% Challenge strategies will be highlighted.
 - Students and staff in each facility will be educated for success on the waste-reduction process.
 - As each facility reaches and maintains (for a minimum of 6 months) the goal of 50% waste reduction, a celebration event will be conducted and a banner identifying the facility and its achievement will be presented.
- h) Sustainability
- Schools will be conducting random audits of waste output to monitor continued success after the project period is completed.

- Strategies for continued success in each facility will be monitored by the project manager.
- i) Project Location
- All facilities of the Hanover School Division in southeastern Manitoba will participate.

Detailed Project Budget

Funding Sources (A)	Cash	In-kind	Total
Hanover School Division (HSD)	38,542.39	16,000.00	54,542.39
WRAPP Funding Requested	25,000.00		25,000.00
Total Project Revenues (Total from D)	0		0
TOTAL	63,543.39	16,000.00	79,542.39

Expense Category <i>Provide an itemized listing of project costs for each expenditure category.</i>	Partner Funding <i>Identify amount and by whom it is to be contributed (create new columns for each partner if needed)</i>		Requested WRAPP Funding (C)	Expenditure Total
	Cash	In-Kind		
Project Personnel Costs (<i>wages, employee benefits</i>)	17,000.00 (HSD)	16,000.00 (HSD)		33,000.00
Management/ Professional Fees (<i>accounting, audit, legal, technical, contractor, consultant</i>)				
Materials/Supplies	9,217.00 (HSD)		25,000.00	34,217.39
Equipment Rental				
Office Costs				
Transportation Costs	12,325.00 (HSD)			12,325.00
Other (Identify)				
TOTAL	38,542.39 (HSD)	16,000.00 (HSD)	25,000.00	79,542.39

Revenue Sources (D)	Budget Amount
TOTAL	0



Budget Details and Calculations

Project Personnel

Cash—Driver on payroll for the two implementation years: \$15/hour X 40 hours per week X 0.33 (one third of the driver's time is dedicated to this project) X 43 weeks (no delivery is required in July and August) = \$17,000.00

In-kind—Approximately 20% of the wage of Russ Dirks, Project Manager (one year), the second year will not need the same time commitment: \$16,000.00

Materials and Supplies

See the quotes attached to the email

Banners—Creative Print-All: \$2,235.00

Large collection bins—Superior Trucks: \$4,936.63

Small collection bins—Lee Valley: \$4,457.60

Compostable servingware and bin liners: \$34,217.39

(Note: All amounts include applicable taxes.)

Transportation Costs

Estimated vehicle cost \$50,000.00 X 0.33 (one-third of the vehicle-use time is dedicated to this project): \$16,500.00

Operation cost (\$0.47/km)—This represents mostly the fuel. Using the distance calculations for a route followed from school to school in the rural zone of HSD (once a week) and a route for urban (City of Steinbach) schools with some larger schools needing more than one pick-up per week, the fuel cost would be about \$80.00 per week X 43 weeks X 2 years = \$6880.00

Note: Because it is a school division, HSD receives money from provincial government departments at various times throughout the year. Details regarding amounts and dates can be supplied if necessary.

HSD became aware of the Waste Reduction and Pollution Prevention Fund through a recommendation by personnel at Manitoba Education and Training—Education for Sustainable Development and by checking on the Manitoba Government website.



Hanover School Division 50% Challenge for Waste Reduction Kick-Start Grant

Recently, HSD received a Waste Reduction and Pollution Prevention (WRAPP) grant from Conservation Manitoba. Our priority is to “Model Integrated Waste Management System Development and Planning.” Reception of this grant was based on the specific goals and objectives that were proposed in the application relating to the 50% Challenge as summarized below:

1. Decrease landfill-directed waste by 50% in Hanover School Division by June 2014.
2. Increase the amount of recyclable materials (that were previously recyclable but were bound for the landfill) collected in Hanover School Division (batteries, number 1-8 plastics, juice boxes, etc.).
3. Change the culture of waste in Hanover School Division by supplying alternative materials (compostable/recyclable/reuseable) to be used in all facilities by June 2014 (ie., discontinued use of Styrofoam and other non-compostable servingware).

Schools meeting ALL of the following criteria may apply for money from this grant allocation. (Please check off to show you have met the criteria before faxing this request form.)

- A plan is in place
 - to collect all compostables in the facility and store them outdoors until they are picked up by the courier
 - to utilize only servingware that can be composted or reused
 - to maximize recycling efforts
- A coordinator is designated.
- There is a commitment to sustainable practices as outlined in the goals and objectives of the 50% Challenge beyond the initial funding allotment.
- There is a commitment to examine the “culture of waste” in the school and use the 50% Challenge as one vehicle to engage students in solutions school-wide and in curricular content where it is possible.



School: _____

Total Population (including all staff and students): _____

Coordinator(s): _____

What will the funding be used for? _____

Amount Requested: _____

Consider the following:

- Price lists for compostable products are posted in the ESF Wiki at <http://esd.wikis.hsd.ca/file/detail/School+Price+List+2012.pdf>.
- Once your application is received, the code for accessing the funds to cover receipts will be sent to the school administrator and coordinators.
- Consideration will be given to the size/need of the school.
- Deadline: ASAP
- Fax form to Russ Dirks at 204-355-4360.



Note: Points of the plan that are **highlighted**, focus on the elements of the HSD 50% Challenge for Waste Reduction

Hanover School Division's Education for Sustainable Futures (ESF) Action Plan 2012–2015



We share Earth... for now and the future...

Our actions affect the future of the next generation
and that generation's actions are learned from us.
What is that generation learning? An education for sustainable
futures involves all of us learning and working together
to live a sustainable life now for the sake of the next generation.

"Enough, For All, Forever."—African Elder

Action Plan Development Teams:

Hecla Team (Fall 2010): Randy Dueck, Russ Dirks, Angela Bertinak-Schinkel,
Lorraine Kehler, Rod Kehler

HSD Evaluation Team (Winter 2012): Randy Dueck, Russ Dirks, Ed Neufeld, Lorraine
Kehler, Cam Kelbert, Ruby Wiens, Kevin Heide, Margaret Wiens, Rachel Allard, Hank Dueck,
Naomi Stobbe, Mark Kubanek, Stephanie Allan

Context: The aim of each Education for Sustainable Futures (ESF) team was to build upon the efforts of earlier teams to further develop education for sustainable development in HSD. Our overarching goal is to affect sustainable, systemic change in all aspects of divisional life so that we model what we teach and teach what we model. We envision a reorienting of our heads, hearts, and hands to engage our students, co-workers, and communities as citizens with sustainable futures. In order to plan, implement, and assess our actions, we aim to embrace the three key components of ESF: environment, economy, and social justice. By weaving these components into action planning, we strive to encourage a high quality of life for the present without compromising the future of the next generation.

Goal 1 Increase engagement in ESF through authentic student learning.

- Develop an ESF policy for HSD.
- Establish ESF Fair school and divisional level opportunities provincially.
- Celebrate ESF and challenge teachers and students toward further action with a divisional WE Day.
- Build vital connections to the curricular outcomes in all subjects/courses of study.
- Have students assess the school and community using the ESF lens/tools.
- Conduct regular assessment of school-based ESF plans using community involvement.
- Offer extra-curricular clubs related to school-based ESF initiatives (social justice clubs, environment clubs, green teams, and so forth)—develop leadership skills and facilitate student action.
- Teach students employable skills that weave in sustainability strategies and enrich career counseling and technical-vocational programs by including green careers for a green economy.

Goal 2 Make meaningful ESF connections with our communities.

- Local
 - Develop public relations strategies to assist the community (in the school, the division, and beyond) in valuing and celebrating the ESF learning and actions in which students are involved.
 - Build connections to community services that enhance ESF.
 - Create adult education opportunities that encourage ESF.
 - Nurture community partnerships through the involvement of formal, non-formal, and informal educators in order to build on ESF foundations.
 - Encourage ESF learning that occurs outside of traditional educational settings (field trips, Tourond Creek Discovery Centre, outdoor learning environments).
 - Promote relationships between school, community, and business.
 - Build an awareness of ESF in terms of social justice, economic and environmental issues, and opportunities for action within our communities.
- Global
 - Build an awareness of social justice, economic and environmental issues, and opportunities for action that enable students to make real contributions globally.
 - Enhance the learning of other cultures via Internet, the relationships with “sister” village communities, and cross-cultural opportunities.



Goal 3 Enable operations and facilities to reflect goals for sustainability.

- Evaluate energy consumption (use technology to audit electrical/gas, water, and materials waste) and implement upgrades to divisional buildings (wind turbines, solar panels, geothermal equipment, temperature control, updated windows and doors, and so on).
- Evaluate, embrace, and maximize the use of technology that will facilitate ESF in schools and communities—skype, pod casts, and so forth.
- Develop outdoor learning environments (OLEs).
- Encourage local food production through gardening (greenhouses, school gardens, community gardens).
- Implement playground improvements that reflect ESF.
- Reduce the amount of garbage generated in all facilities (Plan and implement increased recycling and reusing of materials. Facilitate use of compostable materials and composting practices.)
- Promote school travel planning in each school.
- Review transportation practices and adopt strategies to reduce harmful emissions and save energy (biodiesel, no-idle zones, and so on).

Action Plan

Context: Targeted action is required to embrace the previously stated goals reflecting Education for Sustainable Futures. The following three action plan initiatives build on work already accomplished in the past and enable the networking of staff and students, together with our communities, to accomplish the task. The HSD Action Plan Evaluation Team that met in January 2012 brought a renewed vision for action. Action plan items include a target date (or annual continuation), lead personnel, and specific examples of actions related to goals 1, 2, and 3.

Action Plan 1A Divisional ESF Leadership (Corresponding to Goal 1) Target Date: Annually (unless otherwise stated)

Divisional leaders (teachers and students) within our schools will advance the goals and initiatives for ESF in HSD: Russ Dirks—HSD CST, school administrators.

- Divisional leaders will be in contact with CST to consult and contribute to the ongoing vision for ESF.
- Opportunities for ESF-related resources and projects for schools will be communicated to divisional leaders and administrators from the CST.



- Opportunities to share specific school ESF initiatives with other divisional leaders will be provided (ie., round-table sessions).
- An HSD ESF team (including rural/urban; primary, middle, and senior years teachers; school and senior administration; trustee; and student representation) will be created to assist in the implementation of the ESF action plan and review it, and to assist in the promotion and implementation of divisional events—December 2012.

Action Plan 1B Building ESF Capacity (Corresponding to Goal 1) Target Date: Annually (unless otherwise stated)

The Curriculum Support Teacher (CST), together with administration, teaching staff, and support staff, develop strategies and implement education for sustainable futures in all aspects of divisional life: Russ Dirks—HSD CST, school administrators, and school staff.

- Consult with superintendents to understand and advance the values and vision for ESF in HSD and assist in developing a divisional policy for ESF. (Spring 2013)
- Assist schools in developing ESF plans. (Fall 2014)
- Assist schools in assessing current actions and future initiatives to determine progress using ESD in Manitoba resources provided by Manitoba Education and Training.
- Build capacity in teaching staff and students by giving clarification and assistance to infuse current curricular outcomes with ESF learning outcomes (knowledge, skills, and values) through professional development days, after school sessions, ESD Wiki, round-table groups, and so forth.
- Encourage divisional leaders and administrators to assist their schools in achieving recognition as Eco-Globe Schools through the ESD MB Eco-Globe Schools Recognition Program.
- Provide students and staff opportunities to showcase ESF initiatives—ESF Fair, website, round-table sessions, Learning Matters, HSD WE Day. (Spring 2013)
- Communicate ESF actions with the community to build awareness and promote community-wide action: Articles that are written for Learning Matters would be sent to Steinbach Online and the Carillon News monthly. (Superintendents)
- Enable student voice to further develop vision and action—“What Did You Do in School Today” Survey, We Schools in Action Teams.
- Develop OLEs on schoolyards and make improvements to outdoor environments to enable ESF.

Action Plan 2 Building Community Partnerships for ESF (Corresponding to Goal 2) Target Date: Annually (unless otherwise stated)

A list of community partners, both locally and globally, will be identified, contacted, and invited to become part of the ESF community of formal and informal educators and facilitators: Russ Dirks—HSD CST and other divisional staff.

- Green Action Centre (Woodlawn School, Niverville Collegiate, Niverville Elementary, Landmark Collegiate, and Landmark Elementary are currently in the process of doing school travel planning.)
- Tourond Creek Discovery Centre (TCDC), Seine-Rat River Conservation District (SRRCD), Rural Municipality of Hanover, together with some surrounding school divisions in the watershed are partnering to develop the TCDC site and will meet with other specialists from Fort Whyte Alive and Oak Hammock to develop curriculum. (May/June 2012)
- Fort Whyte Alive: There will be site and school visits and TCDC curriculum development.
- Oak Hammock Marsh: There will be site and school visits and TCDC curriculum development.
- Manitoba Model Forest: There will be TCDC curriculum development.
- **City of Steinbach: Eldon Wallman, City of Steinbach Solid Waste Manager, is currently working with Russ Dirks to enable system-wide waste reduction through industrial composting at the Steinbach Solid Waste site.**
- Seine-Rat River Conservation District (SRRCD): As well as partnering with others on the TCDC project, SRRCD has given guidance to some segments of planning on the OLE's at CMS and SRSS and has offered ongoing support for wetland development.
- **Canada Green Natural Products: This organization will offer favourable pricing to HSD for compostable products and will be a source for research information related to compostable products.**
- Hanover Municipality: There will be TCDC assistance.
- Social responsibility trips will be coordinated with non-governmental organizations (NGOs) and charitable organizations, both locally and globally (Helping Hands, downtown Winnipeg missions, Hope for the Nations, World Vision, Free the Children, and so on).
- Southeast Transition Initiative: We will look to their assistance for gardening projects/local food production and processing.
- **Local field trip opportunities will be listed on the ESD Wiki and encouraged for certain grade levels (Stonelane Orchard, landfill site, second-hand stores, and so on).**
- Partnerships will be developed with local village, town, and city management personnel—schools/classes offer to serve their communities (cleanup days, food drives, and so forth).



Action 3 System-Wide ESF Modeling (Corresponding to Goal 3) Target Date: Annually (unless otherwise stated)

In order to model system-wide sustainability practices in HSD, a waste, water, and energy audit will be conducted using school pilot projects to establish baseline data and real-time monitoring. Support will be given to divisional staff to take action to reduce waste, water, and energy use. Divisional personnel: Ray Fast, Bob Proulx, Randy Dueck, school administrators, school board, and Russ Dirks (CST)

- ESF related pilot projects in specific schools will be conducted. (Landmark Elementary is currently participating in a garbage waste reduction program.)
- All schools will be encouraged to be involved in the “50% Challenge,” a division-wide initiative to reduce garbage waste by 50%. (Spring 2012—details attached)
- Audits of waste and recycling will be conducted to provide baseline data and measurements for successful “50% Challenge” actions. (Spring 2012 and June 2014)
- Each school and other HSD facilities will reduce garbage waste by 50%. (June 2014)
- A comprehensive industrial composting program will be launched in cooperation with the City of Steinbach requiring the collection and transportation of compostable materials from all HSD facilities. (2012–2013)
- Analyze areas where water, energy, and waste reductions are possible and what actions would be required for reduction—Clearspring Middle School and Stonybrook Middle School have been targeted as water, energy, and waste auditing schools. (Fall 2012)
- Equipment will be purchased as required in the audit process. (Winter 2012–2013)
- School yard and indoor project plans (learning projects) related to reduction of waste (gardening, greenhouses, composting stations, use of compostable materials, alternative energy use, replacement of existing toilets with low-flush toilets, and so on) will be facilitated.
- Accomplish ESF actions by facilitating transportation and maintenance department involvement.



Organic Waste Diversion by Hanover School Division

Diversion Site: City of Steinbach Landfill

Source: Eldon Wallman—City of Steinbach Solid Waste Manager

Amounts in metric tonnes

February 2013:	0.50
March 2013:	0.90
April 2013:	0.83
May 2013:	1.23
June 2013:	1.21
(July and August: No deliveries)	
September 2013:	0.93
October 2013:	0.90
November 2013:	1.06
December 2013:	0.74
January 2014:	0.89
February 2014:	1.01
13 month total:	10.2 tonnes



HSD System-wide Industrial Composting Proposal

Vision: Rethink, refuse, restore, recycle, reduce, replace, and reuse to teach, learn, and model for a sustainable future.

Goals

1. Model sustainable practices system wide.
2. Use sustainable practices as a teaching tool.
 - Increase awareness about the nature of waste in our schools and communities.
 - Use compostable materials for school/facility functions that previously used disposable materials.
 - Increase the awareness of the usefulness of composting and compostable materials to produce nutrient-rich soils.
3. Reduce garbage output in the division by 50%.

Overview

The following represents the different streams of materials to consider when minimizing waste in a facility.

Garbage should no longer be the default. It should ONLY be

- non-compostable
- non-recyclable
- non-reusable

Recyclables

- all plastics with a recycling symbol (some may need wiping or rinsing)
- all beverage containers (milk cartons usually need rinsing so that spilled milk will not contaminate the entire recycling bag)
- all paper, including construction paper
- plastic grocery bags can be saved and stored for a “Bag Up Manitoba” event or returned to the grocery store from time to time



Reusables

- upcycling (Terracycling) is possible with collection programs
- plastic food storage bags and other lunch containers

Compostable Materials

- industrial composting (at a municipal facility)
- vermicomposting (using worms in small bins)
- backyard composting (yard/garden style)

In schools that practice waste reduction and have access to an industrial composting facility, compostable items typically include the following:

- paper towels and facial tissues
- all food waste, including dairy products, breads, and meats*
- napkins and compostable servingware

*Schools using backyard composters and/or vermicomposters can have some food waste (fruit and vegetable scraps) separated as needed.

Actions

- All facilities collect compostables on a daily basis (green teams, staff, custodial oversight).
- Compostables are stored until they can be transported to the Municipal Waste Management Facility (Industrial Composting Centre) by divisional courier or other arranged transport (generally once or twice per week).
- Facilities use baseline data and follow-up data to measure and celebrate success.
- Schools visit the composting facility and use the soils for school and class initiatives.

Logistical Considerations

- collection containers and storage in all HSD facilities
- acquisition of 100% compostable bags
- storage outside the building
- transport to Municipal Waste Management Facility (Industrial Composting Centre)
- custodial concerns taken into consideration



Industrial Composting Set-up for Schools

When beginning composting work in school, the following may be helpful:

1. Have a large centralized bin that can be closed when not in use.
2. Use compostable bags in the large bin.
3. Store the large bags in the garbage cage (or other designated area) and put up a sign so the garbage/recyclers don't remove them.
4. Empty small classroom collection containers daily (noon and after school) and rinse out or wash as necessary. You can purchase special containers with an air-filter lid or you can use ice cream pails.
5. All paper towels, coffee filters and grounds, and food scraps can be composted.
6. Use small containers in staff washrooms and staffroom to collect paper towels.
7. There is an HSD transport vehicle driver that will remove these large bags once a week and take the bags to the City of Steinbach Industrial Composting Site. The compost is available free to the public for use in gardens and on yards.
8. If you are not able to have reusable servingware, consider using compostable servingware for all class and school events. This transformation can be an educational journey with topics that include: greenhouse gases, natural processes for material decomposition, caring for Earth, and so on.

The following are a few items to keep in mind:

- Plates, cups, and utensils can all be composted if they are designated “compostable” or made of compostable materials. The term “biodegradable” often means that the product has some biodegradable material but that it is mixed in with the other non-biodegradable material and will allow the materials to break down into small pieces that get mixed into the environment even though they do not compost. Avoid “biodegradeable” products unless it is clearly specified that the materials being put into the environment are compostable not just “environmentally friendly.”
- The normal minimum case lot for cups is 600 (for the 32 ounce size) or 1000 for the rest. You can buy a case so you can use them for all events. For instance, use them for the first class party of the year, wash them after each use throughout the year instead of throwing them out, and talk about the product as a teaching/learning opportunity. The students can each take their cups home at the end of the year or you can compost them.



9. The following is the link to the website for the company that HSD uses:
www.cagreen.ca/Cold+Cups-0.
10. If you just plan on throwing the compostable servingware out after using it, it is a waste of money and will not benefit the landfill because it will not decompose in a landfill. Such servingware must be put into an industrial composting facility to be composted (City of Steinbach Industrial Composting Site in the landfill area).

If you would like one of your staff members to come and take a look at what we do and get ideas for your school, we'd welcome them at Landmark Elementary School.



Recycling Waste at Your School

What Can Be Put in the Recycling Bins?

Plastics

Look for the recycling number in the triangle symbol on the bottom of the item.

- Number 1, 2, 3, 4, 5, 6, 7, and 8 plastics are recyclable.
- All food containers should be empty and not oozing.
- Bottles should be empty and might or might not have their lids on.
- If there is no number on the plastic container, it cannot be recycled. All bags should not enter the regular recycling stream. Bags, wrapping, and packaging could be included in a Bag Up Manitoba project. See www.takepride.mb.ca/index.php?pid=73.) Grocery bags can also be brought back to the grocery stores.

Paper

All clean (not grease stained or wax coated) paper and cardboard are accepted.

- pizza boxes
- milk cartons (well drained)
- juice boxes (drained, with straw and plastic removed)
- newspaper
- general use paper and cardboard packaging
- THIS DOES NOT INCLUDE FACIAL TISSUE, NAPKINS, OR PAPER TOWELS. (These can be diverted to an industrial composting facility.*)

Metal

The contents must be completely emptied.

- pop cans
- lunch serving cans (fruit, etc.)
- coffee cans

All of these items can be put into one recycling bag. They do not need to be separated.

The following items are typical in schools but are not usually recyclable at a municipal recycler:

- Juice pouches – Look up terracycling on the web or check for “upcycling” programs. See www.terracycle.ca/en-CA/zero_waste_boxes/30.
- Grocery bags – Most grocery stores now take grocery bags back. You can also check for ways that you can collect them for programs that create new products with them. See www.takepride.mb.ca/?pid=73.
- School supplies – These can be reused.
- Zip-loc bags – Reuse them or put them in a Bag Up Manitoba Project.
- Food scraps, paper towels, facial tissue – These can be sent for industrial composting and some vegetable matter can be put in backyard composters or vermi composters at your school.
- Electronic items – E-waste should be taken to an e-waste disposal site.
- Dry cells and batteries – These can now be sent away postage-free to depots that recycle them. Your custodian may be collecting these as well from your school. Some municipal solid waste disposal sites will accept these as well.
- Dried out pens, markers, etc. These can be collected for recycling. See www.terracycle.ca/en-CA/brigades/writing-instrument-retail-based-brigade.html.

For more information on other ways to stream items out of the garbage, please contact your divisional waste reduction supervisor or, better yet, get some keen students to do some research.

What can be put in the compostable material collection bins (for industrial composting, where available)?

- **Paper towels/napkins** from washrooms, cafeterias, staffrooms, change rooms, and classrooms, whether they are wet, dry, or dirty
- **Facial tissues** from all areas of the school



- **Food scraps** (includes **all** food matter) from food preparation areas, cafeterias, eating commons, classrooms, and staffrooms
- **Compostable servingware** (e.g., cups, clamshells, plates, and cutlery) should be clearly labeled as compostable

INDUSTRIAL COMPOSTING

- * *Paper Towels*
- * *Facial Tissue*
- * *Food Scraps*



GARBAGE ONLY

(USE COMPOSTING AND RECYCLING
WHENEVER POSSIBLE)





Industrial Composting

(Making NEW earth from old scraps)

- **paper towels**
- **facial tissues**
- **food waste**

**PLEASE,
NO garbage,
NO recyclables,
and NO plastic**



50% Challenge



PAPER TOWELS ONLY

(This matter will go to an industrial composting facility where it can become part of the earth again.)

THINK FIRST

Is it possible to REUSE items?

If not...

Recycle plastics



Recycle all clean paper

No paper towel or kleenex please!

Recycle cans



50% Challenge



APPENDIX O

Landmark Elementary School Students Make Suggestions to the Town of Landmark on How to Be More Ecologically Responsible (Spring 2013)

(The following suggestions were taken directly from
Landmark Elementary School students.)

How to Be More Ecologically Responsible
Make a flower garden in the streets and pathway.
Have recycling bins throughout Landmark so people can recycle everywhere.
People can use windmills to make electricity for their homes.
Use homemade products like acorns, lint, wax, or glue to make a homemade fire starter.
By making less garbage.
We could have one place to drop off our recycling so that we don't have to have a truck driving around town all day, putting more gas in the air. Also save on plastic bags that we put our recycling in.
By picking up garbage at recess instead of having recess and causing people to get into fights.
By replacing regular light bulbs with energy-saving CFL bulbs.
Dry their clothes outside instead of using their dryer.
By collecting food scraps and putting the soil from the scraps into town flower beds, and using solar panels in local businesses like the Co-op.
Walk or bike around Landmark instead of using cars.
Walk to school or bike so we can get energy and we don't pollute.
To make a BMX park because kids aren't destroying natural habitat.
Collect rain water to water your plants and lawn.
Fundraiser swap out grocery plastic bags and purchase reusable bags, plant more trees.
By recycling cans, reusing plastic bags, and being green.
If everybody would grow your own garden. They wouldn't have to buy fruits and vegetables at the grocery store.
If they all would recycle any metal and bring it to one location in Landmark, and our church could pick it up for a charitable receipt.
We can put recycling boxes around Landmark instead of garbage cans.
I think everyone should stop smoking.
Grow a community garden and serve the fresh food at the Landmark Friendship Festival.
Recycle more.
I think if you see a piece of garbage on the ground then pick it up or stop littering.
By putting litter in the garbage.



How to Be More Ecologically Responsible

Make all public places like playgrounds, arena, schools, gas stations, post office, bank etc. idle free zones and put signs up that say Landmark is an idle free community.

By getting people to walk or ride a bike instead of driving a car.

Staff a community garden.

By making a large bin for composting kitchen waste in spring this compost could be placed on a community garden.

Install a couple compost bins somewhere locally, for anyone to use and have a Landmark farmers market once a week, sell ecofriendly washable sandwich bags as a fundraiser for the school.

If people installed water saving toilets in their homes and businesses.

If they had a compost drop off.

To get the arena to recycle.

You should get recycling bins for plastic grocery bags, because the normal bins don't take them.

By having 206 grill and co-op use paper instead of Styrofoam.

Poster contest and put them up in the community encouraging people to use less energy and water.

Use scrap paper instead of always a new piece.

Not throwing garbage out the window of your car.

A recycling bin for the out of town people to bring their recycling.

If every Friday or any day of the week, we could only walk or bike places.

If we could bring toilets and metal (e.g., hot water tanks and appliances) to the dump to be recycled.

Community compost.

By putting recycling containers around town so that people can keep our community clean. We should add more trash cans too.

The rink and soccer field and baseball diamonds should have recycle bins everywhere.

We could take one class each day and they will go around town and pick up garbage.

Recycle at the arena.

Community garden for everyone who doesn't own a tiller or have yard space. Also a community composter.

By planting trees.

Recycling cardboard.

Buy in bulk—this would reduce individually wrapped items such as juice boxes, potato chip bags and fruit cups.

The town of Landmark could appoint someone to help new home builders and existing home owners to make green choices.

I'm at the rink a lot and I noticed they have no recycling. They need to get recycling bins at the arena.

The addition of public recycling drop off centre (e.g., fluorescent light bulbs).

Schools and businesses reward plus for using reusable lunch containers.

Classes should pick up litter around town more often than Earth day.

When you're having a picnic, take your garbage with you. Don't leave it on the ground.



How to Be More Ecologically Responsible

By everybody having a composter in their back yard.

Landmark could start a park and ride car pool.

If they would get small garbage cans so they don't throw away as much and big recycling and compost containers.

By making a car pooling website so more people would car pool.

By picking up garbage all over town.

Go geothermal heating house with water and the sun.

By putting signs above composting recycling and garbage and draw the items that go in the right bin.

By putting garbage, recycle, compost into the right bin.

Central recycling deposit site for the town, recycling at the post office.

A competition building contraptions using recycled items, auction items off as a fundraiser for solar powered green houses.

Composting station just outside of town.

Place recycle bins next to all the garbage cans around town.

Town compost.

Plant more trees.

Place recycle bins next to all the garbage cans around town.

Water fountain at picnic shelter so people can refill water bottles, reduce amount of plastic bottles in landfill.

Composting bins in park.

Sell compost bins and kitchen compost collectors town-wide at subsidized price.

Set up more recycling bins around town.

Composting food.

Tax credit to people who have a grey water recycling system in their house.

Install wind turbines to power the towns energy needs.

I would like to set up a booth at the Friendship Festival to explain composting, give away a composter as a prize.

By charging people for more than one garbage bag per week.

Limited amount of garbage per house, costs more for bags, recycling unlimited.

By turning off the lights when they're done in the room.

By cleaning up garbage and not littering, more garbage cans around town.

Solve rain water in ground, into tanks to pump on lawn.

Don't leave the taps running, don't leave the lite on in your room.

Pick up garbage around the town.

Solar panels on houses and businesses to save energy.

Being responsible.

Recycle everywhere.

If we had recycling bins at the arena and at the Friendship Festival.



How to Be More Ecologically Responsible

Everyone should compost.

Have recycling bins beside the garbage bins.

Compost can be collected along with garbage and recycling.

Every month have a day to pick up garbage.

We could ride a bike in the summer time and walk in summer and winter.

By making longer sidewalks so that people can walk not drive.

By raising awareness in town, advertising ways that people can make changes.

By recycling more.

By picking up garbage around town.

Put recycling and garbage cans in more public places like stores, schools, and park.

More composting, more accessible recycling bins, walking instead of driving short distances.

By idling less, letting less smog and smoke into the sky.

Raising money to buy instant water heaters so that we do not waste water by having it run.

By putting recycling bins around Landmark and one big one at the park to bring your bags just in case you miss recycling day.

We all have clean up days once a month, clean up as a community.

To have recycling dumpsters in town to drop stuff off.

If we had a wind turbine, it would help to provided energy to our school.

If we had solar panels on the school roof, and other businesses and homes; then we would use less electricity.

Give incentives so everyone in town recycles.

Reuse plastic bags.

If everyone mulched their Christmas trees and used the mulch in their flower beds.

To put more recycling bins in place.

Carpool.

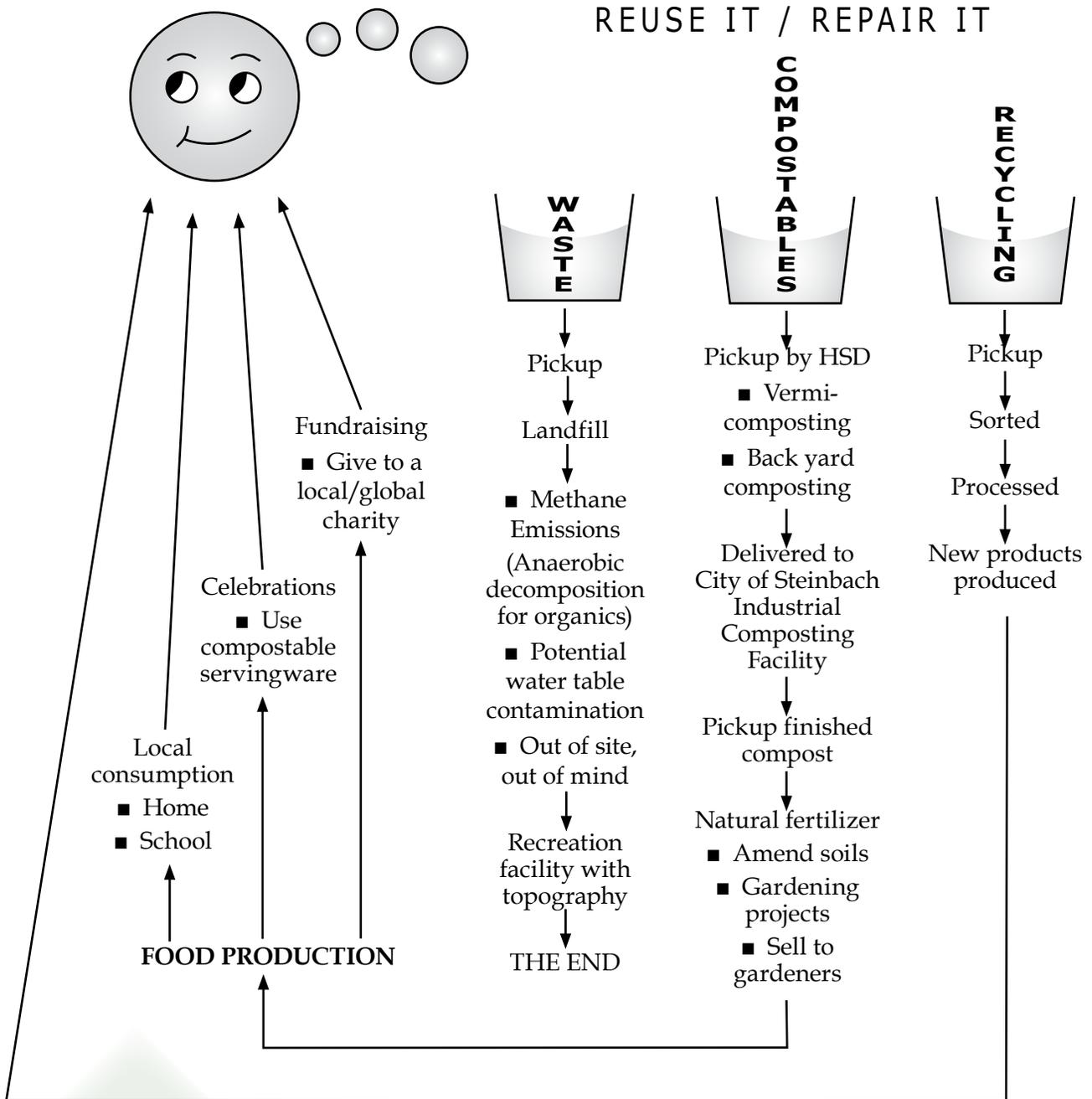


Time it Takes for Garbage to Decompose in the Environment

Items that are left in the environment rather than sent for recycling take a long time to decompose. The decomposition time can range from a few weeks for some food waste to one million years for glass bottles. Specific examples can be found at the following website:

http://des.nh.gov/organization/divisions/water/wmb/coastal/trash/documents/marine_debris.pdf. (U.S. National Park Service; Mote Marine Lab, Sarasota, Florida)

Rethinking Garbage





Follow-up Audit Letter to Schools

Congratulations to all schools and HSD facilities for your efforts in taking on the 50% Challenge for Waste Reduction over the last two years. In the last 13 months alone, we have diverted **10.2 tonnes** of compostable material from the landfill! At the industrial composting site near Steinbach, this diverted material is now breaking down into a rich compost that people from our schools and communities can use on their lawns and gardens starting later this spring. If all the compostable material was put in the landfill cells as we did in the past, these materials, often wrapped in two layers of plastic bags, would have been breaking down very slowly (without the benefit of oxygen to enable proper decomposition) and emitting methane gas, considered to be one of the worst of the greenhouse gases. It just makes sense for us to use this valuable resource instead of just throwing it away. In addition, the increased diligence with recycling has further reduced landfill-directed waste. Let's sustain our new habits so changes in the culture of waste will have a long-term and multiplied effect.

It's time to see how we have been doing and where we can still make changes for improvement. Please reply to this email with an update. Administrators, facility staff, and ESF school leaders, should request the assistance of the custodians to gather the following data. Once you have obtained this data, please fill in the sections below and reply to the email by **March 28, 2014**.

Data Detail Required

Name of School/Facility: _____

Person Reporting: _____

Date: _____

School/Facility Population
(including all staff—teachers, administrative personnel, EA's, custodians, etc.): _____

The average number of large bags of garbage per week at your facility: _____

The average number of large recycling bags per week at your facility: _____

Comments/questions about the success of your efforts or about further assistance you may need to make improvements:

A P P E N D I X S

Learning Outcomes Related To Solid Waste



Science, Social Studies, Physical Education/Health Education, and Technology Education

This appendix lists learning outcomes from Science, Social Studies, Physical Education/Health Education, and Technology Education that are connected to the topic of solid waste.

Even though there is no mention of English Language Arts and Mathematics outcomes, waste reduction and other related ESD themes can often be infused in English language arts and mathematics classes.

Examples of Curricular Connections to Solid Waste

Each subject area has a large variety of connections to the theme of solid waste.

A few examples are as follows:

- Kindergarten Social Studies: **VL-003**—*Appreciate the beauty and importance of the natural environment. In the Apply section of K.3.2: The Natural Environment, one of the options is that “Students engage in actions to support the environment. Students discuss the beauty and importance of the natural environment and identify actions they can take to support it (e.g., cleaning up litter, recycling, conserving water..).”*
- Grade 1 Science: **1-3-11**—*Demonstrate ways to reduce, reuse, and recycle materials during classroom learning experiences. GLO: B5, D3.*
- Grade 7 Social Studies: **KC-004**—*Describe ways in which their personal actions may affect quality of life for people elsewhere in the world. Examples: consumer choices, conservation actions, sharing of resources, letters and petitions...*

- Grade 10 Physical Education/Health Education: **K.3.S2.B.4**—Investigate **the contributions self and/or others can make to community/global health and sustainable development** (i.e., maintaining safe and healthy lifestyle practices, volunteering, reducing, reusing, recycling).
- Technology Education’s Home Economics Grade 10 Senior Years Family Studies: **S2 3.1.4**—Determine environmental and economic issues related to children’s clothing (e.g., cloth vs. disposable diapers, unisex clothing, second-hand clothing).
- Technology Education’s Grade 12 Sustainable Energy: Biomass Systems 40S/40E/40M (8293)—Describe the sustainability practices related to biomass systems and their impact on the environment.

GLO, SLO

Learning outcomes are classified as General Learning Outcomes (GLO) and Specific Learning Outcomes (SLO). There are some small differences between what the different subject areas include in their GLO and SLO designations. In Social Studies, values and skills are directly included in the SLO section. In Physical Education/Health Education, a series of attitude indicators are given prominence. The attitude indicators are shown immediately following the GLO section. Also worth noting is that in Science for Kindergarten to Grade 10, the term Prescribed Learning Outcomes (PLO) is used. The terms PLO and SLO are essentially synonymous.

Each subject area has a slightly different GLO and SLO; however, the meaning is basically the same. The following Physical Education/Health Education GLO and SLO definitions are good examples of the intent of the definitions.

General Learning Outcomes

General student learning outcomes are broad statements identifying the knowledge, skills, and attitudes that students are expected to demonstrate with increasing competence and confidence from Kindergarten to Senior 4. (*K-4 Physical Education/Health Education: A Foundation for Implementation*, 2000. 16.)

Specific Learning Outcomes

Specific learning outcome (SLO) statements define what students are expected to achieve by the end of the grade. (*Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation*, 2009. 62.)

Selection Criteria

A broad approach was used to identify potential Manitoba curricular connections. The main term used to link curricular outcomes to solid waste was the term waste. When the term



waste appeared in the curricula an examination was made to determine if the reference to waste included solid waste, not just liquid or gaseous waste.

Other terms examined to determine potential connections included solid waste disposal, procurement, recycling, composting, feedstock, by-product, reduce, reuse, recycle, environment, sustainability, humus, sustainable development, and cradle to cradle.

When an SLO made reference to a program such as R 2000, ISO 1400, and WHMIS an examination was made to investigate if there was a connection to solid waste.

Because worms and fungi are so important to the decomposition of solid waste, learning objects related to these two terms have been included even if the term waste is not specifically mentioned.

The problem-solving skills do not specifically mention waste; however, the skills could be applied to a solid waste problem encountered in production or in designing products that are easily recyclable (cradle to cradle).

In cases where pollution starts in a liquid form or, like soil, is dissolved in water during a flood and then settles into a solid waste, the specific learning outcome is included. An example is **8-4-17**—Identify substances that may pollute water, related environmental and societal impacts of pollution, and ways to reduce or eliminate effects of pollution. Include: filtration, settling, chlorination, fluoridation. GLO: B2, B3, B5, D5. Soil erosion and the subsequent settling of soil particles.

Also included are SLO problem-solving skills. The problem-solving skills usually do not specifically mention waste; however, the skills could be applied to solid waste issues. A number of learning outcomes provide the personal and social management skills that are needed to identify the issues, propose solutions, and initiate action regarding solid waste issues. Physical Education/Health Education is the richest source of these skills.

Curriculum Reviewed

The following is a list of the most up-to-date versions of documents available on the Manitoba Education and Training web site at www.edu.gov.mb.ca/k12/cur/ as of September 29, 2014.

The following documents were reviewed for connections to solid waste:

Science

Kindergarten to Grade 4 Science: A Foundation for Implementation, 1999

Grades 5 to 8 Science: A Foundation for Implementation, 2000

Senior 1 Science: Manitoba Curriculum Framework of Outcomes, 2000

Senior 2 Science: Manitoba Curriculum Framework of Outcomes, 2003

Grade 11 Biology: A Foundation for Implementation, 2010



Grade 11 Chemistry: A Foundation for Implementation, 2006
Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation, 2006
Senior 3 Physics 30S: A Foundation for Implementation, 2003
Grade 12 Biology: A Foundation for Implementation, 2011
Grade 12 Chemistry: A Foundation for Implementation, 2013
Grade 12 Interdisciplinary Topics in Science 40S – Draft, November 2008
Senior 4 Physics 40S: A Foundation for Implementation, 2005

Social Studies

Kindergarten Being Together: A Foundation for Implementation, 2005
Grade 1 Connecting and Belonging: A Foundation for Implementation, 2005
Grade 2 Communities in Canada: A Foundation for Implementation, 2005
Grade 3 Communities of the World: A Foundation for Implementation, 2004
Grade 4 Manitoba, Canada, and the North: Places and Stories: A Foundation for Implementation, 2004
Grade 5 People and Stories of Canada to 1867: A Foundation for Implementation, 2005
Grade 6 Canada: A Country of Change (1867 to Present): A Foundation for Implementation, 2006
Grade 7 People and Places in the World: A Foundation for Implementation, 2006
Grade 8 Social Studies: World History: Societies of the Past: A Foundation for Implementation, 2006
Grade 9 Social Studies: Canada in the Contemporary World: A Foundation for Implementation, 2007
Grade 10 Social Studies: Geographic Issues of the 21st Century: Manitoba Curriculum Framework of Outcomes and A Foundation for Implementation, 2006
Grade 11 History of Canada, 2014
Grade 12 Global Issues: Citizenship and Sustainability
Grade 12 Current Topics in First Nations, Métis, and Inuit Studies, 2011

Physical Education/Health Education

K-4 Physical Education/Health Education: A Foundation for Implementation, 2001
Grades 5-8 Physical Education/Health Education: A Foundation for Implementation, 2002
Grades 9 and 10 (Senior 1 and 2) Physical Education/Health Education: A Foundation for Implementation, 2004
Grade 11 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation, 2008
Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation, 2009

Technology Education

Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers, 2003

The Middle Years Home Economics/Industrial Arts: Linking Living to Learning: A Support Document for Teachers, 2003

Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes, 2004

Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes, 2009

Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes—Unedited Draft, August 2014

Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2013

Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014

Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014

Science

Note: The latest information regarding Manitoba courses is available at www.edu.gov.mb.ca/k12/cur/science/scicurr.html. The information in this document was valid as of September 29, 2014.

Prescribed Learning Outcomes (PLO) is the term used from Kindergarten to Grade 10. Conversely, in Grade 11 and 12, the term Specific Learning Outcomes (SLO) is used.

The following science curricula were examined to find potential learning outcomes connected to the term solid waste and related terms. Related terms included procurement, recycling, composting, environment sustainable, and sustainability.

Science Documents Reviewed

Kindergarten to Grade 4 Science: A Foundation for Implementation, 1999

Grades 5 to 8 Science: A Foundation for Implementation, 2000

Senior 1 Science: Manitoba Curriculum Framework of Outcomes, 2000

Senior 2 Science: Manitoba Curriculum Framework of Outcomes, 2003

Grade 11 Biology: A Foundation for Implementation, 2010

Grade 11 Chemistry: A Foundation for Implementation, 2006

Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation, 2006

Senior 3 Physics 30S: A Foundation for Implementation, 2003

Grade 12 Biology: A Foundation for Implementation, 2011

Grade 12 Chemistry: A Foundation for Implementation, 2013



Grade 12 Interdisciplinary Topics in Science 40S—Draft, November 2008
Senior 4 Physics 40S: A Foundation for Implementation, 2005

General Learning Outcome (GLO)

General Learning Outcomes (GLO) “provide links across the entire scope of the Kindergarten to Grade 12 continuum of learning in science. These GLOs provide connections to the Five Foundations for Scientific Literacy that guide all Manitoba science curricula in all science discipline areas.” (*Grade 12 Biology: A Foundation for Implementation*, 2011. section 3.3)

Specific Learning Outcomes (SLO)

Specific Learning Outcomes “outline the intended learning to be achieved by the student by the end of the course.” (*Grade 12 Biology: A Foundation for Implementation*, 2011. section 3.3)

The term Prescribed Learning Outcomes (PLO) is used in Kindergarten to Grade 10 while the term Specific Learning Outcomes (SLO) is used in Grade 11 and 12.

Science Kindergarten

Source: *Kindergarten to Grade 4 Science: A Foundation for Implementation*, 1999.
www.edu.gov.mb.ca/k12/cur/science/found/kto4/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Trees
K-1-06: Recognize that some trees lose their leaves in the fall, while others do not. GLO: D1
K-1-07: Describe seasonal changes in the life of a tree. <i>Examples:</i> leaves of some trees change colour and drop off in the fall... GLO: D1
Cluster 3: Paper
K-3-07: Use the design process to construct a paper product for a particular use. <i>Examples:</i> paper cup, envelope, paper mat, box... GLO: C3

General Learning Outcomes (GLO)

K-1-06, K-1-07: GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans.

K-3-07: GLO: C3. Demonstrate appropriate problem-solving skills while seeking solutions to technological challenges.

Science Grade 1

Source: *Kindergarten to Grade 4 Science: A Foundation for Implementation*, 1999.
www.edu.gov.mb.ca/k12/cur/science/found/kto4/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Characteristics and Needs of Living Things
1-1-06: Observe and identify similarities in life processes between themselves and other living things. <i>Examples:</i> they sleep, grow, and breathe, and do other living things... GLO: D1, E1
1-1-06: Describe what is needed to care for a pet, a farm animal, or an indoor plant. <i>Examples:</i> provide fresh water for their hamster daily, feed and bed calves regularly... GLO: B4, B5
1-1-12: Identify hobbies and jobs that require knowledge of the needs of living things. <i>Examples:</i> gardeners, nurses, zookeepers... GLO: B4, B5
1-1-13: Develop, implement, and evaluate personal and group action plans that contribute to a healthy environment for themselves and for other living things. <i>Examples:</i> wash hands before eating, reduce amount of waste produced by the class...GLO: C5, C7
Cluster 3: Characteristics of Objects and Materials
1-3-01: Use appropriate vocabulary related to their investigations of objects and materials. <i>Include:</i> characteristics, wood, metal, plastic, cloth, waterproof, absorbent, rigid, pliable, join, recycle. GLO C2, D3
1-3-11: Demonstrate ways to reduce, reuse, and recycle materials during classroom learning experiences. GLO: B5, D3

General Learning Outcomes (GLO)

- 1-1-06:** GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans. GLO: E1. Describe and appreciate the similarity and diversity of forms and patterns within the natural and constructed world.
- 1-1-06, 1-1-12, 1-3-11:** GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.
- 1-1-06, 1-1-12:** GLO: B4. Demonstrate a knowledge of, and personal consideration for, a range of possible science- and technology-related interests, hobbies, and careers.
- 1-1-13:** GLO: C5. Demonstrate curiosity, skepticism, creativity, open-mindedness, accuracy, precision, honesty, persistence, and appreciate their importance as scientific and technological habits of mind. GLO C7. Work cooperatively and value the ideas and contributions of others while carrying out scientific and technological activities.
- 1-3-01:** GLO: C2. Demonstrate appropriate scientific-inquiry skills when seeking answers to questions.
- 1-3-01, 1-3-11:** GLO: D3. Understand the properties and structure of matter, as well as various common manifestations play a role in a wide range of natural and constructed contexts.



Science Grade 2

Source: *Kindergarten to Grade 4 Science: A Foundation for Implementation*, 1999.
www.edu.gov.mb.ca/k12/cur/science/found/kto4/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 2: Properties of Solids, Liquids, and Gases
2-2-02: Identify substances, materials, and objects as solids or liquids. GLO:D3
2-2-16: Describe ways humans dispose of solids and liquids to maintain a clean and healthy environment. <i>Examples:</i> take used car oil and old paints to collection sites, recycle newspapers... GLO: B5
Cluster 4: Air and Water in the Environment
2-4-12: Identify substances that pollute air and water, and describe ways of reducing such pollution. <i>Examples:</i> car exhaust, smoke, carbon monoxide, oil, house paints, and sewage. GLO: B3, B5, D3, D5

General Learning Outcomes (GLO)

2-2-02, 2-4-12: GLO: D3. Understand the properties and structure of matter, as well as various common manifestations play a role in a wide range of natural and constructed contexts.

2-2-16, 2-4-12: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

2-4-12: GLO: B3. Identify the factors that affect health and explain the relationships among personal habits, lifestyle choices, and human health, both individual and social. GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

Science Grade 3

Source: *Kindergarten to Grade 4 Science: A Foundation for Implementation*, 1999.
www.edu.gov.mb.ca/k12/cur/science/found/kto4/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Growth and Changes in Plants
3-1-17: Investigate to determine how humans from various cultures make useful products from plant materials. <i>Examples:</i> lumber milling, paper making, rope making, fabric making... GLO A3, A4, B1
Cluster 4: Soils in the Environment
3-4-01: Use appropriate vocabulary related to their investigations of soils in the environment. Include: soil, soil component, loam, clay, sand, pebbles, organic matter, humus, rocks, sedimentation, sieving, water-holding capacity

3-4-02: Identify and describe various components within a sample of soil from the local environment. *Examples:* clay, loam, sand, pebbles, organic matter, humus, rocks... GLO: D5

3-4-09: Identify animals found in soil and explain their importance to soil quality. *Examples:* worms, insects, and mammals help to aerate the soil or increase nutrients... GLO: B5, D2

3-4-10: Describe ways to return organic matter to the soil. *Examples:* composting, spreading manure on fields... GLO: B1, B5, D2, D5

3-4-11: Use the design process to construct a simple composter that returns organic matter to the soil. *Examples:* classroom composter for left-over food, school compost ... GLO: B1, B5, C3, D2

General Learning Outcomes (GLO)

3-1-17: GLO A3. Distinguish critically between science and technology in terms of their respective contexts, goals, methods, products, and values. GLO: A4. Identify and appreciate contributions made by women and men from many societies and cultural backgrounds towards increasing our understanding of the world and in bringing about technological innovations.

3-1-17, 3-4-10, 3-4-11: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

3-4-01: GLO: C6. Employ effective skills and utilize information technology to gather and share scientific technological ideas and data.

3-4-01, 3-4-10: GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

3-4-09, 3-4-11: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

3-4-09, 3-4-10, 3-4-11: GLO: D2. Understand various biotic and abiotic components of ecosystem, as well as various common manifestations and applications of the actions of natural and constructed contexts.

3-4-11: GLO: C3. Demonstrate appropriate problem-solving skills while seeking solutions to technological challenges.

Science Grade 4

Source: *Kindergarten to Grade 4 Science: A Foundation for Implementation, 1999.*

Prescribed Learning Outcomes (PLO)

Cluster 1: Habitats and Communities

4-1-01: Use appropriate vocabulary related to their investigations of habitats and communities. Include: habitat, physical adaptation, behavioural adaptation, traditional knowledge, technological development, population, community, food chain, food web, organism, producer, consumer, herbivore, omnivore, carnivore, predator, prey, scavenger, endangerment, extinction, conservation. GLO: C6, D2

4-1-15: Describe how their actions can help conserve plant and animal populations and their habitats. *Examples:* clean up a local stream to improve fish and bird habitat... GLO: B5

4-4-12: Investigate and describe ways in which soil erosion is controlled or minimized in their community and in communities around the world. *Examples:* windbreaks, retaining walls, terracing, cover crops, reforestation... GLO: A5, B1, B5

Cluster 4: Rocks, Minerals, and Erosion

4-4-12: Investigate and describe ways in which soil erosion is controlled or minimized in their community and in communities around the world. *Examples:* windbreaks, retaining walls, terracing, cover crops, reforestation... GLO: A5, B1, B5

4-4-13: Use the design process to determine an appropriate system for controlling soil erosion in a given situation. GLO: B1, B5, C3, E3

4-4-15: Identify natural phenomena and human activities that cause significant changes in the landscape. *Examples:* floods, avalanches, mud slides, hydroelectric dams, clearing land for agriculture, clear-cut forestry, forest fires... GLO: B5, D5, E3

General Learning Outcomes (GLO)

4-1-01: GLO: C6. Employ effective communication skills and utilize information technology to gather and share scientific and technological activities. GLO: D2. Understand various biotic and abiotic components of ecosystem, as well as various common manifestations and applications of the actions of natural and constructed contexts.

4-1-15, 4-4-12, 4-3-13, and 4-4-15: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

4-4-12: GLO: A5. Recognize that science and technology interact with and advance one another.

4-4-12, 4-4-13: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

4-4-13: GLO: C3. Demonstrate appropriate problem-solving skills while seeking solutions to technological challenges.

4-4-13, 4-4-15: GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

4-4-15: GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

Science Grade 5

Source: *Grades 5 to 8 Science: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/science/found/5to8/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Maintaining a Healthy Body

5-1-06: Identify the major components of the digestive system, and describe its role in the human body. *Include:* teeth, mouth, esophagus, stomach, and intestines break down food. GLO: D1, E2

5-1-11: Describe how the human body gets rid of waste. *Include:* kidneys filter blood and dispose of waste as urine; lungs give off waste carbon dioxide; the rectum collects and expels undigested food matter. GLO: D1, E2

Cluster 2: Properties of and Changes in Substances

5-2-10: Recognize that a physical change alters the characteristics of a substance without producing a new substance, and that a chemical change produces a new substance with distinct characteristics and properties. GLO: D3, E3

5-2-11: Observe examples of changes in substances, classify them as physical or chemical changes, and justify the designation. *Examples:* physical—bending a nail, chopping wood, chewing food; chemical—rusting of a nail, burning wood, cooking food... GLO C2, D3, E3

5-2-12: Identify potentially harmful chemical products used at home, and describe practices to ensure personal safety. *Include:* use of products with parental supervision, recognition of safety symbols, procedures to follow in case of an emergency, proper storage of chemical products. GLO: B1, C1, D3

5-2-14: Research and describe how raw materials are transformed into useful products. *Examples:* food processing, oil refining, paper milling, plastic moulding, gold smelting... GLO: B1, B4, C2, E3

5-4-02: Describe how weather conditions may affect the activities of humans and other animals. *Examples:* heavy rainfall may cause roads to wash out; stormy conditions may prevent a space shuttle launching; in excessive heat cattle may produce less milk... GLO: D5

General Learning Outcomes (GLO)

5-1-06: GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans; GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

5-1-06, 5-1-11: GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

5-2-10, 5-2-11, 5-2-14: GLO: D3. Understand the properties and structure of matter, as well as various common manifestations play a role in a wide range of natural and constructed contexts.

5-2-10, 5-2-11, 5-2-14: GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

5-2-11, 5-2-14: GLO: C2. Demonstrate appropriate scientific inquiry skills when seeking answers to questions.

5-2-12, 5-2-14: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally. GLO: B4. Demonstrate a knowledge of, and personal consideration for, a range of possible science-and technology-related interests, hobbies, and careers.

5-2-12: GLO: C1. Recognize safety symbols and practices related to scientific and technological activities and to their daily lives, and apply this knowledge in appropriate situations.

5-2-14: GLO: D5. Understand the composition of the Earth’s atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

Science Grade 6

Source: *Grades 5 to 8 Science: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/science/found/5to8/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Diversity of Living Things

6-1-06: Identify the five kingdoms commonly used for the classification of living things, and provide examples of organisms from each to illustrate the diversity of living things.
Include: monerans, protists, fungi, plants, animals. GLO: A1, D1, E1, E2

6-1-10: Provide examples of a variety of invertebrates to illustrate their diversity. *Include:* sponges, worms, molluscs, arthropods. GLO: D1, E1

Cluster 3: Electricity

6-3-16: Identify renewable and non-renewable sources of electrical energy, and discuss advantages and disadvantages of each. *Examples:* renewable sources such as hydroelectric, wind, geothermal, solar; non-renewable sources such as fossil fuels, nuclear fission...
GLO: B5, E4

Cluster 4: The Solar System

6-4-05: Describe positive and negative impacts arising from space research programs.
Examples: advantages—increased knowledge about space and medicine, the development of technologies such as orange drink crystals and pocket calculators; disadvantages—space pollution and the high cost of research projects... GLO: A1, B1, B5, D6

General Learning Outcomes (GLO)

6-1-06, 6-4-05: GLO: A1. Recognize both the power and limitations of science as a way of answering questions about the world and explaining natural phenomena.

6-1-06, 6-1-10: GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans. GLO: E1. Describe and appreciate the similarity and diversity of forms, and patterns within the natural and constructed world.

6-1-06: GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

6-3-16: GLO: E4. Recognize that energy, whether transmitted or transformed, is the driving force of both movement and change, and is inherent within materials and in the interactions among them.

6-3-16, 6-4-05: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

6-04-05: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally. GLO: D6. Understand the composition of the universe, the interactions within it, and the impacts of humankind’s continued attempt to understand and explore it.

Science Grade 7

Source: *Grades 5 to 8 Science: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/science/found/5to8/full_doc.pdf

Prescribed Learning Outcomes (PLO)

Cluster 1: Interactions within Ecosystems
7-1-01: Use appropriate vocabulary related to their investigations of interactions within ecosystems. <i>Include:</i> ecosystem, biosphere, abiotic, biotic, organisms, ecological succession, photosynthesis, cellular respiration, ecological pyramid, bioaccumulation, scavengers, decomposers, micro-organisms. GLO: C6, D2
7-1-06: Identify environmental, social, and economic factors that should be considered in the management and preservation of ecosystems. <i>Examples:</i> habitat preservation, recreation, employment, industrial growth, resource development... GLO: B1, B5, D2, E2
7-1-11: Explain, using ecological pyramids, the potential for bioaccumulation within an ecosystem. GLO: D2, E2, E4
7-1-12: Provide examples of scavengers and decomposers, and describe their role in cycling matter in an ecosystem. <i>Include:</i> micro-organisms. GLO: D2, E1, E2, E3
7-1-14: Identify beneficial and harmful roles played by microorganisms. <i>Examples:</i> beneficial—aid in digestion, composting, food and vaccine production; harmful—cause disease, food spoilage... GLO: B3, C2, D2
Cluster 4: Earth’s Crust
7-4-07: Identify geological resources that are present in Manitoba and Canada, and describe the processes involved in their location, extraction, processing, and recycling. <i>Include:</i> fossil fuels, minerals. GLO: A5, B5, D3, D5
7-4-08: Identify environmental impacts of geological resource extraction, and describe techniques used to address these. GLO: B1, B5, C1, C3
7-4-10: Describe methods used to control soil erosion, and recognize the importance of soil conservation. <i>Examples:</i> economically important to the agri-food industry, important for controlling the flow of water, necessary for plant growth... GLO: A5, B2, B5, E3

General Learning Outcomes (GLO)

7-1-01: GLO: C6. Employ effective communication skills and utilize information technology to gather and share scientific and technological activities.

7-1-01, 7-1-06, 7-1-11, 7-1-12, 7-1-14: GLO: D2. Understand various biotic and abiotic components of ecosystem, as well as various common manifestations and applications of the actions of natural and constructed contexts.

7-1-06, 7-4-08: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

7-1-06, 7-4-07, 7-4-08, 7-4-10: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

7-1-06, 7-1-117-1-12: GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

7-1-11: GLO: E4. Recognize that energy, whether transmitted or transformed, is the driving force of both movement and change, and is inherent within materials and in the interactions among them.

7-1-12, 7-4-10: GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

7-4-07: GLO: A5. Recognize that science and technology interact with and advance one another. GLO: D3. Understand the properties and structure of matter, as well as various common manifestations play a role in a wide range of natural and constructed contexts. GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

7-4-08: GLO: C1. Recognize safety symbols and practices related to scientific and technological activities and to their daily lives, and apply this knowledge in appropriate situations. GLO: C3. Demonstrate appropriate problem-solving skills while seeking solutions to technological challenges.

7-4-10: GLO: B2. Recognize that scientific and technological endeavours have been and continue to be influenced by human needs and societal context of time. GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

Science Grade 8

Source: *Grades 5 to 8 Science: A Foundation for Implementation*, 2000
www.edu.gov.mb.ca/k12/cur/science/found/5to8/full_doc.pdf.

Prescribed Learning Outcomes (PLO)

Cluster 1: Cells and Systems

8-1-02: Identify characteristics of living things, and describe how different living things exhibit these characteristics. *Include:* composed of cells; reproduce; grow; repair themselves; require energy; respond to the environment; have a lifespan; produce wastes. GLO: D1, E1

8-1-07: Describe the movement of nutrients and wastes across cell membranes and explain its importance. *Include:* osmosis, diffusion, selective permeability. GLO: D1

8-1-13: Identify components of blood and describe the function of each. *Include:* red blood cells carry oxygen; white blood cells fight infection; platelets clot blood; plasma is the liquid part of blood that transports blood cells, dissolved material, nutrients, and waste products. GLO: D1

Cluster 4: Water Systems

8-4-08: Describe how erosion and deposition are influenced by the flow rate of a stream or river, and contrast the related characteristics of young and mature streams. *Examples:* meanders, oxbows, alluvial deposits, sandbars, flood plains, deltas... GLO: C8, D5, E3

8-4-09: Describe how wave action and ice movement in large bodies of water cause erosion and deposition. GLO: D5, E3

8-4-10: Explain how tides are caused and describe their effects on shorelines. GLO: D5, D6

8-4-15: Explain how and why water may need to be treated for use by humans. Include: filtration, settling, chlorination, fluoridation. GLO: B1, B3, D5

8-4-16: Compare the waste-water disposal system within their communities to one used elsewhere. *Include:* process involved, environmental impact, cost. GLO: B2, B5

8-4-17: Identify substances that may pollute water, related environmental and societal impacts of pollution, and ways to reduce or eliminate effects of pollution. *Include:* filtration, settling, chlorination, fluoridation. GLO: B2, B3, B5, D5

General Learning Outcomes (GLO)

8-1-02, 8-1-07, 8-1-13: GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans.

8-1-02: GLO: E1. Describe and appreciate the similarity and diversity of forms, and patterns within the natural and constructed world.

8-4-08: GLO: C8. Evaluate from a scientific perspective, information and ideas encountered during investigations and in daily life.

8-4-08, 8-4-09, 8-4-10, 8-4-15, 8-4-17: GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

8-4-08, 8-4-09: GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

8-4-10: GLO: D6. Understand the composition of the universe, the interactions within it, and the impacts of humankind's continued attempt to understand and explore it.

8-4-15: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

8-4-15, 8-4-17: GLO: B3. Identify the factors that affect health and explain the relationships among personal habits, lifestyle choices, and human health, both individual and social.

8-4-16, 8-4-17: GLO B2. Recognize that scientific and technological endeavours have been and continue to be influenced by human needs and societal context of time. GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.



Science Grade 9 (Senior 1)

Source: *Senior 1 Science: Manitoba Curriculum Framework of Outcomes*. 2000.
www.edu.gov.mb.ca/k12/cur/science/found/s1/full_doc.pdf.

None of the Clusters (Cluster 1: Reproduction, Cluster 2: Atoms and Elements, Cluster 3: The Nature of electricity, nor Cluster 4: Exploring the Universe) have a direct relationship to the topic of solid waste.

Science Grade 10 (Senior 2)

Source: *Senior 2 Science: Manitoba Curriculum Framework of Outcomes*, 2003.
www.edu.gov.mb.ca/k12/cur/science/found/s2/s2_fulldoc.pdf.

Specific Learning Outcomes (SLO)

Note that a Cluster 0: Overall Skills and Attitudes is included in the curriculum document at the start of the clusters. While specific learning outcomes in Cluster 0 are general and do not mention the term solid waste or its related terms, the Science, Technology, Society and the Environment (STSE) provides an approach to researching. In other science curriculum documents the cluster 0 is included in a separate section from the other clusters, units, or topics.

Cluster 1: Dynamics of Ecosystems
S2-1-01: Illustrate and explain how carbon, nitrogen, and oxygen are cycled through an ecosystem. GL: D2, D3, D5, E2
S2-1-02: Discuss factors that may disturb biogeochemical cycles. <i>Include:</i> natural events, human activities... GLO: D2, D3, D5,E2
S2-1-03: Describe bioaccumulation and explain its potential impact on consumers. <i>Examples:</i> DDT, lead, dioxin, PCBs, mercury... GLO: B1, D2
S2-1-10: Investigate how human activities affect an ecosystem and use the decision-making model to propose a course of action to enhance its sustainability. <i>Include:</i> impact on biochemical cycling, population dynamics, and biodiversity... GLO: B5, C4,C8
Cluster 2: Chemistry in Action
S2-2-11: Describe the formation and environmental impact of various forms of air pollution. <i>Examples:</i> acid precipitation, ground level ozone, air-borne particulates, smog, ozone depletion, respiratory ailments, and acidification lakes... GLO: B5, C6, D2, D5
S2-2-12: Investigate technologies that are used to reduce emissions of potential air pollutants. <i>Examples:</i> catalytic converters in automobiles, regulations of vehicle emissions, elimination of CFCs from refrigerants and aerosol propellants... GLO: A5, B5, C8,E2

General Learning Outcomes (GLO)

S2-1-01, S2-1-02, S2-2-03, S2-2-11: GLO: D2. Understand various biotic and abiotic components of ecosystem, as well as various common manifestations and applications of the actions of natural and constructed contexts.



S2-1-01, S2-1-02: GLO: D3. Understand the properties and structure of matter, as well as various common manifestations play a role in a wide range of natural and constructed contexts.

S2-1-01, S2-1-02, S2-2-11: GLO: D5. Understand the composition of the Earth's atmosphere, hydrosphere, and lithosphere, as well as the processes involved within and among them.

S2-1-01, S2-1-02, S2-2-12: GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

S2-1-03: GLO: B1. Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

S2-1-10, S2-2-11, S2-2-12: GLO: B5. Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

S2-1-10: GLO: C4. Demonstrate appropriate critical thinking and decision-making skills when choosing a course of action based on scientific and technological information.

S2-1-10, S2-2-12: GLO: C8. Evaluate from a scientific perspective, information and ideas encountered during investigations and in daily life.

S2-2-10: GLO: C6. Employ effective skills and utilize information technology to gather and share scientific technological ideas and data.

S2-2-12: GLO: A5. Recognize that science and technology interact with and advance one another.

Science Biology Grade 11

Source: *Grade 11 Biology: A Foundation for Implementation*, 2010
www.edu.gov.mb.ca/k12/cur/science/found/gr11_bio/gr11_biology.pdf

Specific Learning Outcomes (SLO)

Unit 1: Wellness and Homeostasis

B11-4-01: Identify the primary metabolic wastes produced in the human body and the source of each. (GLO: D1) *Include:* ammonia, urea, mineral salts, carbon dioxide, and water

B11-1-04: Describe how the body attempts to maintain an internal balance called homeostasis, recognizing that the conditions in which life processes can occur are limited. (GLOs: D1, E2, E3) *Include:* thermoregulation (maintenance of body temperature), osmoregulation (water balance), and waste management

B11-1-06: Identify life processes that individual cells, as well as complex organisms, need to manage. (GLOs: D1, E1) *Include:* obtain food, convert energy, eliminate wastes, reproduce, grow and repair, and transport substances

Unit 2: Digestion and Nutrition

B11-2-01: Identify major structures and functions of the human digestive system from a diagram, model, or specimen. (GLO: D1) *Include:* tongue, teeth, salivary glands, epiglottis, esophagus, pharynx, sphincters, stomach, small intestine, large intestine, rectum, anus, appendix, liver, gallbladder, pancreas, and uvula

S2-2-12: Investigate technologies that are used to reduce emissions of potential air pollutants. *Examples:* catalytic converters in automobiles, regulations of vehicle emissions, elimination of CFCs from refrigerants and aerosol propellants... GLO: A5, B5, C8, E2

Unit 4: Excretion and Waste Management

B11-4-02: Describe the roles of the major excretory structures in eliminating wastes and helping the body maintain homeostasis. (GLOs: D1, E2) *Include:* kidneys, lungs, skin, and intestines

General Learning Outcomes (GLO)

B11-4-01, B11-1-04, B11-1-06, B11-2-01, B11-4-02: GLO: D1. Understand essential life structures and processes pertaining to a wide variety of organisms, including humans.

B11-1-04, B11-2-02: GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

B11-1-04: GLO: E3. Recognize that characteristics of materials and systems can remain constant or change over time, and describe the condition and processes involved.

B11-1-06: GLO: E1. Describe and appreciate the similarity and diversity of forms, and patterns within the natural and constructed world.

Science Grade 11 Chemistry

Source: *Grade 11 Chemistry: A Foundation for Implementation*, 2006.
www.edu.gov.mb.ca/k12/cur/science/found/gr11_chem/full_doc.pdf

Specific Learning Outcomes (SLO)

Topic 4: Solutions

C11-4-19: Describe the process of treating a water supply, identifying the allowable concentrations of metallic and organic species in water suitable for consumption.

General Learning Outcomes (GLO)

C11-4-19: GLO: A5: Recognize that science and technology interact with and advance one another. GLO: B1: Describe scientific and technological developments—past and present—and appreciate their impact on individuals, societies, and the environment, both locally and globally. GLO: B3: Identify the factors that affect health, and explain the relationships among personal habits, lifestyle choices, and human health, both individual and social. GLO: C2: Demonstrate appropriate scientific inquiry skills when seeking answers to questions. GLO:

C4: Demonstrate appropriate critical thinking and decision-making skills when choosing a course of action based on scientific and technological information.

Science Grade 11 Current Topics in Science 30S

Source: *Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*, 2006.
www.edu.gov.mb.ca/k12/cur/science/found/c_topics30s/full_doc.pdf.

The curricular approach to *Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation* is different from the standard science curriculum approach.

“This curriculum document provides the framework for planning and developing thematic units in Senior 3 Current Topics in the Sciences. Each topic selected and developed as a unit of study should address a number of the specific learning outcomes (SLOs), as derived from the four general learning outcomes (GLOs) (see Appendix 1 for an SLO Tracking Chart). By the end of the course of study, the student will have encountered, and will have had adequate opportunity to achieve, each of the SLOs at least once. Some SLOs—due in part to the manner in which these are addressed—may require treatment across more than one unit in the course in order to be adequately accomplished.” (*Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*, Introduction. p 6.)

“Multidisciplinary topics based on current issues serve as the organizing themes for this curriculum, in which scientific knowledge and its implications are presented in a unified manner, integrating the areas of biology, chemistry, physics, and geosciences. The curriculum shifts the focus from teaching concepts and facts to teaching critical thinking and problem-solving skills developed through the study of a particular topic, from which key concepts and facts will evolve.” (*Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*, Introduction. p 7.)

Teachers may decide to choose a topic from the suggestions listed [...], develop a topic based on one of their own strengths or interests, or involve students in brainstorming a current scientific topic of interest that includes a significant treatment of scientific ideas, perspectives, content, and processes. (*Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*: Implementation of Senior 3 Current Topics in the Sciences. p 23.)

Thus solid waste reduction could be one of the topic studies in *Senior 3 Current Topics in Science*. The following three suggested topics could also include solid waste issues:

- Environmental Interactions
- Is the World Doing Enough to Reduce Pollution?
- Recycling: Is It Working?

All of the following General and Specific Learning Outcomes for Senior 3 Current topics in the Sciences could apply to a solid waste reduction topic. The GLO B: Science, Technology, Society, and the Environment and GLO C: Scientific and Technological Skills and Attitudes have the greatest likelihood of having connections.

GLO A: NATURE OF SCIENCE AND TECHNOLOGY

Differentiate between science and technology, recognizing their strengths and limitations in furthering our understanding of the world, and appreciate the relationship between culture and technology.

SLO A1: Distinguish critically between science and technology in terms of their respective contexts, goals, methods, products, and values.

SLO A2: Recognize both the power and limitations of science as a way of answering questions about the world and explaining natural phenomena.

SLO A3: Identify and appreciate the manner in which history and culture shape a society's philosophy of science and its creation or use of technology.

SLO A4: Recognize that science and technology interact and evolve, often advancing one another.

SLO A5: Describe and explain disciplinary and interdisciplinary processes used to enable us to investigate and understand natural phenomena and develop technological solutions.

GLO B: SCIENCE, TECHNOLOGY, SOCIETY, AND THE ENVIRONMENT

Explore problems and issues that demonstrate interdependence among science, technology, society, and the environment.

SLO B1: Describe scientific and technological developments, past and present, and appreciate their impact on individuals, societies, and the environment, both locally and globally.

SLO B2: Recognize that scientific and technological endeavours have been, and continue to be, influenced by human needs and by societal and historical contexts.

SLO B3: Identify the factors that affect health and explain the relationships of personal habits, lifestyle choices, and human health, both individual and social.

SLO B4: Demonstrate a knowledge of, and personal consideration for, a range of possible science- and technology-related interests, hobbies, and careers.

SLO B5: Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

GLO C: SCIENTIFIC AND TECHNOLOGICAL SKILLS AND ATTITUDES

Demonstrate appropriate inquiry, problem-solving, and decision-making skills and attitudes for exploring scientific and/or technological issues and problems.

SLO C1: Demonstrate appropriate scientific inquiry skills, attitudes, and practices when seeking answers to questions.

SLO C2: Demonstrate appropriate technological problem-solving skills and attitudes when seeking solutions to challenges and problems related to human needs.

SLO C3: Demonstrate appropriate critical thinking and decision-making skills and attitudes when choosing a course of action based on scientific and technological information.



SLO C4: Employ effective communication skills and use a variety of resources to gather and share scientific and technological ideas and data.

SLO C5: Work cooperatively with others and value their ideas and contributions.

GLO D: ESSENTIAL CONCEPTS

Explore, understand, and use scientific knowledge in a variety of contexts.

SLO D1: Use the concepts of similarity and diversity for organizing our experiences with the world.

SLO D2: Recognize that the universe comprises systems and that complex interactions occur within and among these systems at many scales and intervals of time.

SLO D3: Understand the processes and conditions in which change, constancy, and equilibrium occur.

SLO D4: Understand how energy is the driving force in the interaction of materials, processes of life, and the functioning of systems.

Specific Learning Outcomes (SLO)

In the suggestions for instruction for the following SLOs, the word(s) waste and/or recycling is/are mentioned. The linkage of other SLO connections depends on the specific parts and wording of the topic.

SLO B2: Recognize that scientific and technological endeavours have been, and continue to be, influenced by human needs and by societal and historical contexts.

SLO B3: Identify the factors that affect health and explain the relationships of personal habits, lifestyle choices, and human health, both individual and social.

SLO B5: Identify and demonstrate actions that promote a sustainable environment, society, and economy, both locally and globally.

SLO C2: Demonstrate appropriate technological problem-solving skills and attitudes when seeking solutions to challenges and problems related to human needs.

SLO C4: Employ effective communication skills and use a variety of resources to gather and share scientific and technological ideas and data.

SLO C5: Work cooperatively with others and value their ideas and contributions.

SLO D1: Use the concepts of similarity and diversity for organizing our experiences with the world.

Science Grade 11 Physics

Source: *Senior 3 Physics 30S: A Foundation for Implementation*, 2003
www.edu.gov.mb.ca/k12/cur/science/found/physics30s/full_doc.pdf

None of the topics (Topic 1: Waves, Topic 2: The Nature of Light, Topic 3: Mechanics, nor Topic 4: Fields) have a direct relationship to the topic of solid waste.



Science Grade 12 Biology

Source: *Grade 12 Biology: A Foundation for Implementation*, 2011
www.edu.gov.mb.ca/k12/cur/science/found/gr12_bio/full_doc.pdf

Specific Learning Outcomes (SLO)

Unit 5: Conservation of Biodiversity

B12-5-04: Investigate an issue related to the conservation of biodiversity. (GLOs: C4, C6, C8, D2, E2) *Examples:* heritage seeds, water quality in Lake Winnipeg, land-use designations, hydroelectric development...

General Learning Outcomes (GLO)

B12-5-04: GLO: C4. Demonstrate appropriate critical thinking and decision-making skills when choosing a course of action based on scientific and technological information. GLO: C6. Employ effective skills and utilize information technology to gather and share scientific technological ideas and data. GLO: C8. Evaluate from a scientific perspective, information and ideas encountered during investigations and in daily life. GLO: D2. Understand various biotic and abiotic components of ecosystem, as well as various common manifestations and applications of the actions of natural and constructed contexts. GLO: E2. Describe and appreciate how the natural and constructed world is made up of systems and how interactions take place within and among these systems.

Science Grade 12 Chemistry

Source: *Grade 12 Chemistry: A Foundation for Implementation*, 2013
www.edu.gov.mb.ca/k12/cur/science/found/gr12_chem/full_doc.pdf

Specific Learning Outcomes (SLO)

Topic 1: Reactions in Aqueous Solutions

C12-1-12: Research practical applications of redox reactions. *Examples:* rocket fuels, fireworks, household bleach, photography, metal recovery from ores, steelmaking, aluminum recycling, fuel cells, batteries, tarnish removal, fruit clocks, forensic blood detection using luminol, chemiluminescence/bioluminescence, electrolytic cleaning, electrodeposition, photochemical etching, antioxidants/preservatives...

General Learning Outcomes (GLO)

C12-1-12: GLO: A3. Distinguish critically between science and technology in terms of their respective contexts, goals, methods, products, and values. GLO: A4. Identify and appreciate contributions made by women and men from many societies and cultural backgrounds that have increased our understanding of the world and brought about technological innovations. GLO: A5. Recognize that science and technology interact with and advance one another. GLO:

B1. Describe scientific and technological developments—past and present—and appreciate their impact on individuals, societies, and the environment, both locally and globally. GLO: B2. Recognize that scientific and technological endeavours have been and continue to be influenced by human needs and the societal context of the time. GLO: B4. Demonstrate knowledge of and personal consideration for a range of possible science- and technology related interests, hobbies, and careers. GLO: C2. Demonstrate appropriate scientific inquiry skills when seeking answers to questions. GLO: C4. Demonstrate appropriate critical thinking and decision-making skills when choosing a course of action based on scientific and technological information. GLO: C5. Demonstrate curiosity, skepticism, creativity, open-mindedness, accuracy, precision, honesty, and persistence, and appreciate their importance as scientific and technological habits of mind. GLO: C6. Employ effective communication skills and use information technology to gather and share scientific and technological ideas and data. GLO: C7. Work cooperatively and value the ideas and contributions of others while carrying out scientific and technological activities. GLO: D3. Understand the properties and structures of matter, as well as various common manifestations and applications of the actions and interactions of matter.

Science Grade 12 Interdisciplinary Topics in Science 40S

Source: *Grade 12 Interdisciplinary Topics in Science 40S – Draft*, November 2008.
www.edu.gov.mb.ca/k12/cur/science/gr12_interdisciplinary_draft.pdf.

According to the New Senior Years Science Curriculum section of Manitoba Education and Advanced Literacy Science Curriculum section (www.edu.gov.mb.ca/k12/cur/science/updates.html#timelines) the *Interdisciplinary Topics in Science 40S*, currently under development, complements Grade 11 Current Topics in the Sciences 30S.

There are seven pages of GLO and SLO. The GLO are identical to the ones in *Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*, 2006 except for GLO B. GLO B wording is changed slightly to read GLO B: Science, Technology, Society and the Environment: Explore problems and issues that demonstrate interdependence among science, technology, society and the environment within the context of sustainability.

All of the General and Specific Learning Outcomes for *Interdisciplinary Topics in Science 40S*, could apply to a solid waste reduction topic. The GLO B: Science, Technology, Society, and the Environment and GLO C: Scientific and Technological Skills and Attitudes have the greatest likelihood of having connections.

There are thirty-seven SLOs in Grade 12 Interdisciplinary Topics in Science 40S compared to nineteen in the *Senior 3 Current Topics in the Sciences 30S: A Foundation for Implementation*, 2006. The SLO that has the highest likelihood of being connected to a solid waste topic is SLO B1: Identify and explore a current STSE issue. *Examples:* clarify what the issue is, identify different viewpoints and/or stakeholders, research existing data/information...



Science Grade 12 Physics 40S

Source: *Senior 4 Physics 40S: A Foundation for Implementation*, 2005.
www.edu.gov.mb.ca/k12/cur/science/found/physics30s/full_doc.pdf.

There are not any direct connections between solid waste and the specific learning outcomes of *Senior 4 Physics 40S: A Foundation for Implementation*, 2005.

The closest connection is in Section 2: Implementation which states “The environmental consequences of the industrial applications of chemistry, or the atmospheric physics of climate change, raise issues of considerable importance, as do the topics of nuclear waste disposal and weapons procurement.” (*Senior 4 Physics 40S: A Foundation for Implementation*, 2005. Section 2, p 12.)

Social Studies

Note: The latest information regarding courses is available at www.edu.gov.mb.ca/k12/cur/socstud/index.html. The information in this document was valid as of September 29, 2014.

The following Social Studies curricula were examined to find potential learning outcomes connected to the term solid waste and related terms. Related terms included procurement, recycling, composting, environmentally sustainable, sustainable development, and sustainability.

Social Studies Documents Referenced

- Kindergarten Social Studies: *Being Together: A Foundation for Implementation*, 2005
- Grade 1 Social Studies: *Connecting and Belonging: A Foundation for Implementation*, 2005
- Grade 2 Social Studies: *Communities in Canada: A Foundation for Implementation*, 2005
- Grade 3 Social Studies: *Communities of the World: A Foundation for Implementation*, 2004
- Grade 4 Social Studies: *Manitoba, Canada, and the North: Places and Stories: A Foundation for Implementation*, 2004
- Grade 5 Social Studies: *People and Stories of Canada to 1867: A Foundation for Implementation*, 2005
- Grade 6 Social Studies: *Canada: A Country of Change (1867 to Present): A Foundation for Implementation*, 2006
- Grade 7 Social Studies: *People and Places in the World: A Foundation for Implementation*, 2006
- Grade 8 Social Studies: *World History: Societies of the Past: A Foundation for Implementation*, 2006
- Grade 9 Social Studies: *Canada in the Contemporary World: A Foundation for Implementation*, 2007

Grade 10 Social Studies: *Geographic Issues of the 21st Century: Manitoba Curriculum Framework of Outcomes and A Foundation for Implementation*, 2006

Grade 11 History of Canada

Grade 12 Global Issues: *Citizenship and Sustainability*

Grade 12 Current Topics in First Nations, Métis, and Inuit Studies, 2011

General Learning Outcomes

“The **general learning outcomes** are broad statements that provide a conceptual structure for social studies, and are the basis for the specific learning outcomes in each grade.” (Grade 6 Social Studies: *Canada: A Country of Change, 1867 to Present: A Foundation for Implementation* 2006, p 35.)

Specific Learning Outcomes

“**Specific learning outcomes** are statements that describe the **skills, knowledge, and values** that students are expected to achieve in each grade.” (Grade 6 Social Studies: *Canada: A Country of Change (1867 to Present): A Foundation for Implementation* 2006, p 35.)

Note: One of the skills listed for the Kindergarten to grade 6 Social Studies is **S-103**—Make decisions that reflect care, concern, and responsibility for the environment.

Social Studies Kindergarten

Source: Kindergarten Social Studies: *Being Together: A Foundation for Implementation*, 2005.
www.edu.gov.mb.ca/k12/cur/socstud/foundation_k/index.html.

In the Apply section of K.3.2: The Natural Environment one of the options is that “Students engage in actions to support the environment. Students discuss the beauty and importance of the natural environment and identify actions they can take to support it (e.g., cleaning up litter, recycling, conserving water...). The SLOs shown are: **KI-012**, **KL-013**, and **VL-003**.” Kindergarten Social Studies: (*Being Together: A Foundation for Implementation*, 2005, p 133.)

Specific Learning Outcomes (SLO)

Cluster 3: The World Around Me—K.3.2: The Natural Environment

KL-012: Describe characteristics of the local physical environment.

KL-013: Give examples of how the natural environment influences daily life. *Examples:* work, play, clothing...

VL-003: Appreciate the beauty and importance of the natural environment.



General Learning Outcomes (GLO)

KL-012, KL-013, VL-003: The Land: Places and People: Students will explore the dynamic relationships of people with the land, places, and environments.

Social Studies Grade 1

Source: Grade 1 Social Studies: *Connecting and Belonging: A Foundation for Implementation*, 2005. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr1/index.html.

Note: In the Apply section of 1.2.5: The Natural Environment, KL-012,

“Students plan and conduct a campaign to promote environmental stewardship and sustainability. Students create posters identifying elements of the natural environment, and describing ways in which the natural environment brings beauty and benefits to their lives.” (Grade 1 Social Studies: *Connecting and Belonging: A Foundation for Implementation*, 2005. p 106.)

Specific Learning Outcomes (SLO)

Cluster 2: My Environment—1.2.4: My Community

VL-008: Respect neighbourhood and community places and landmarks. *Examples:* do not litter or vandalize...

Cluster 2: My Environment—1.2.5: The Natural Environment

KL-012: Recognize that people depend on the environment for survival.

VL-007: Appreciate the beauty and benefits that the natural environment brings to their lives.

VL-007A: Value the special relationships Aboriginal people have with the natural environment.

General Learning Outcomes (GLO)

VL-008, KL-012, VL-007, VL-007A: The Land: Places and People: Students will explore people’s dynamic relationships with the land, places, and environments.

Social Studies Grade 2

Source: Grade 2 Social Studies: *Communities in Canada: A Foundation for Implementation*, 2005 www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr2/index.html.

Specific Learning Outcomes (SLO)

Cluster 2: Communities in Canada—2.2.3: Natural Resources

KL-022: Explain the importance of conserving or restoring natural resources.



General Learning Outcomes (GLO)

KL-022: The Land: Places and People: Students will explore people’s dynamic relationships with the land, places, and environments.

Grade 3 Social Studies

Source: Grade 3 Social Studies: *Communities of the World: A Foundation for Implementation*. 2004. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr3/index.html.

Specific Learning Outcomes (SLO)

Cluster 2: Exploring the World—3.2.4: Personal Responsibilities

KG-027: Give examples of concerns common to communities around the world.

KG-031: Give examples of personal decisions and actions that may positively affect people locally or globally. *Examples:* charitable donations and projects, recycling...

General Learning Outcomes (GLO)

VL-008, KL-012, VL-007, VL-007A: The Land: Places and People: Students will explore people’s dynamic relationships with the land, places, and environments.

Global Interdependence Students will explore the global interdependence of people, communities, societies, nations, and environments.

Grade 4 Social Studies

Source: Grade 4 Social Studies: *Manitoba, Canada, and the North: Places and Stories: A Foundation for Implementation*, 2004. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr4/index.html.

Note: In the Apply section of 4.2.3: Public and Private Property, “Students create and present scenarios that illustrate issues related to public and private property (e.g., retrieving a ball from a neighbour’s yard, littering, crossing private property...)” The SLOs shown are KE-047 and VE-012. (Grade 4 Social Studies: *Manitoba, Canada, and the North: Places and Stories: A Foundation for Implementation*, 2004. p 88.)

Note: In the Apply section of Cluster 2: Living in Canada—4.2.5: Government, students plan and conduct a campaign to address a local community issue (e.g., recycling, waste disposal, playground enhancement...). Students identify actions and solutions that may be initiated by government and individuals. Students determine how to educate individuals and contact appropriate government representatives to suggest how they might address the issue. The SLOs shown are: KC-002, KP-041, KP-042, and KE-048. (Grade 4 Social Studies, *Manitoba, Canada, and the North: Places and Stories A Foundation for Implementation*, 2004. p 100.)

Specific Learning Outcomes (SLO)

Cluster 2: Living in Canada—4.2.3: Public and Private Property
KE-047: Use examples to distinguish between public and private property.
VE-012: Respect public and private property.
Cluster 2: Living in Canada—4.2.4: Power and Authority
VC-001: Be willing to contribute to their groups and communities.
Cluster 2: Living in Canada—4.2.5: Government
KC-002: Identify democratic ideals in Canadian society. <i>Examples:</i> equality, freedom, citizen participation in government...
KP-041: Explain the purposes of government.
KP-042: Identify levels of government in Canada and give examples of their responsibilities. <i>Include:</i> municipal or local, provincial or territorial, First Nation, and federal governments.
KE-048: Identify various ways in which governments help people meet their needs. <i>Examples:</i> education, health care, sanitation...
Cluster 3: Living in Manitoba—4.3.2: Environmental Stewardship and Sustainability
KL-023: Identify issues related to environmental stewardship and sustainability in Manitoba.
KL-023: Be willing to contribute to their groups and communities.
KL-024: Give examples of Aboriginal peoples' traditional relationships with the land.
VL-006: Appreciate Manitoba's natural environment.
VL-006A: Respect their spiritual Connections to the Natural Environment (land, water, sky).

General Learning Outcomes (GLO)

Note: The SLO **KG-040:** Recognize that personal decisions and actions can affect people elsewhere in the world (*Examples:* UNICEF, Project Love, recycling projects...) only appears in the GLO section of Global Independence. It does not appear in any of the clusters.

The SLOs **VC-001** and **KC-002** do not appear in the GLO section. They are found in **Core Concept: Citizenship**. Students will develop the knowledge, skills, and values necessary to become responsible democratic citizens who are actively engaged in their local, national, and global communities.

KL-023, KL-024, VL-006, VL-006A: The Land: Places and People: Students will explore people's dynamic relationships with the land, places, and environments.

KP-041, KP-042: Power and Authority: Students will explore the processes and structures of power and authority, and their implications for individuals, relationships, communities, and nations.

KE-047, VE-012, KE-048: Economics Resources: Students will explore the distribution of resources and wealth in relation to individuals, communities, and nations.

Grade 5 Social Studies

Source: Grade 5 Social Studies: *People and Stories of Canada to 1867: A Foundation for Implementation*, 2005. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr5/index.html.

Note: **S-103**: Make decisions that reflect the principles of sustainable development, is one of the skills listed for grades 5 through 8.

Specific Learning Outcomes (SLO)

Cluster 1: First People—5.1.2: Connections to the Land
VE-015 : Be willing to consider diverse approaches to resource and land use.
KL-017 : Describe practices and beliefs that reflected First People’s connection with the land and the natural environment.
Cluster 2: Early European Colonization (1600–1763)—5.2.3: Cultural Interaction in Early Canada
KE-051 : Compare First Peoples’ and European approaches to natural resource use in early Canada. <i>Examples</i> : hunting and fishing, agriculture, trade, landholding and ownership...
Cluster 4: From British Colony to Confederation (1763–1867)—5.4.5: Citizenship Then and Now
VC-002 : Be willing to contribute to their groups and communities.

General Learning Outcomes (GLO)

The SLO **VC-002** does not appear in the GLO section. It is found in **Core Concept: Citizenship**. *Students will develop the knowledge, skills, and values necessary to become responsible democratic citizens who are actively engaged in their local, national, and global communities.*

KL-017: The Land: Places and People: Students will explore people’s dynamic relationships with the land, places, and environments.

VE-015, KE-051: Economics Resources: Students will explore the distribution of resources and wealth in relation to individuals, communities, and nations.

Grade 6

Source: Grade 6 Social Studies: *Canada: A Country of Change (1867 to Present): A Foundation for Implementation*, 2006. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr6/index.html.

Note: In the Apply section of 6.2.3: Depression, “Collaborative groups of students design activities for special occasions for a family during the Depression (e.g., a board game using recycled materials, a simple dessert or recipe book, a radio play, card games, songs, a community entertainment night... .” The SLO shown includes: KL-024. (Grade 6 Social Studies: *Canada: A Country of Change (1867 to Present): A Foundation for Implementation*, 2006. p 145.)

Specific Learning Outcomes (SLO)

Cluster 2: An Emerging Nation (1914–1945)—6.2.3: Depression
KL-024: Give examples of the influence of the natural environment on daily life for various groups during the Depression.
Cluster 4: Canada Today: Democracy, Diversity, and the Influence of the Past—6.4.1: Expression of Canadian Identity
VL-011: Value the Natural Environment.
Cluster 4: Canada Today: Democracy, Diversity, and the Influence of the Past—6.4.2: Government in Canada
KP-052: Identify the main responsibilities of municipal, provincial, First Nations, and federal governments in Canada.

General Learning Outcomes (GLO)

The SLO **VC-011** does not appear in the GLO section. It is found in **Core Concept: Citizenship**. *Students will develop the knowledge, skills, and values necessary to become responsible democratic citizens who are actively engaged in their local, national, and global communities.*

KL-024: The Land: Places and People: Students will explore people’s dynamic relationships with the land, places, and environments.

KP-052: Power and Authority: Students will explore the processes and structures of power and authority, and their implications for individuals, relationships, communities, and nations.

Grade 7

Source: Grade 7 Social Studies: *People and Places in the World: A Foundation for Implementation*. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr7/index.html.

Note: One of the skills listed for Grade 7, 8, and 9 is **S-103:** Make decisions that reflect the principles of sustainable development.

Specific Learning Outcomes (SLO)

Cluster 2: Global Quality of Life—What is the Good Life?
KC-004: Describe ways in which their personal actions may affect quality of life for people elsewhere in the world. <i>Examples:</i> consumer choices, conservation actions, sharing of resources, letters and petitions...
KI-006: Identify diverse cultural and social perspectives regarding quality of life. <i>Examples:</i> differing concepts of poverty and wealth; materialism...
Cluster 4: Human Impact in Europe or the Americas—7.4.2 Environmental Impact
KE-053: Describe sustainable development issues in a society of Europe or the Americas.
VL-009: Be willing to take actions to help sustain the natural environment in Canada and the world.



Cluster 4: Human Impact in Europe or the Americas—7.4.3A Urbanization

KE-051: Identify common challenges faced by large urban centres. *Examples:* economic, environmental, social

Cluster 4: Human Impact in Europe or the Americas—7.4.5 Living in the Global Village

KP-044: Identify ways in which government decisions may affect human impact on the natural environment.

KP-054: Give examples of the social impact of consumerism in the local community and in a society of Europe or the Americas.

VL-017: Be willing to consider the consequences of their consumer choices to help sustain the natural environment in Canada and the world.

General Learning Outcomes (GLO)

KI-006: Identity, Culture, and Community: Students will explore the influence of culture and community on individuals and societies.

VL-009: The Land: Places and People: Students will explore the dynamic relationships of people with the land, places, and environments.

KC-004, KP-044: Power and Authority: Students will explore the processes and structures of power and authority, and their implications for individuals, relationships, communities, and nations.

KE-053, KE-051, KP-054, VL-017: Economics and Resources: Students will explore the distribution of resources and wealth in relation to individuals, communities, nations, and the natural environment.

Grade 8

Source: Grade 8 Social Studies: *World History: Societies of the Past: A Foundation for Implementation*, 2006. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr8/index.html.

Specific Learning Outcomes (SLO)

Cluster 1: Understanding Societies Past and Present—8.1.3 Societies and Civilizations

VL-008: Appreciate the importance of sustaining the natural environment for future societies.

General Learning Outcomes (GLO)

VL-008: The Land: Places and People: *Students will explore the dynamic relationships of people with the land, places, and environments.*

Grade 9

Source: Grade 9 Social Studies: *Canada in the Contemporary World: A Foundation for Implementation*. www.edu.gov.mb.ca/k12/cur/socstud/foundation_gr9/index.html.

Note: In the Apply section of 9.2.4: Citizen Participation, “Students decide as a class, with minimal teacher intervention, on a citizenship project to support as a school. Possible ideas include: Environmental citizenship initiatives” The SLOs shown are KC 013, KC-013 A, and VP-015 (Grade 9 Social Studies: *Canada in the Contemporary World: A Foundation for Implementation*, 2007. p 199.)

Specific Learning Outcomes (SLO)

Cluster 2: Democracy and Governance in Canada—9.2.4: Citizen Participation
KC-013: Describe their responsibilities and rights as citizens of Canada and the world.
KC-013A: Describe their responsibilities and rights as Aboriginal citizens in Canada and the world.
VP-015: Be willing to exercise their responsibilities and rights as citizens living in a democracy. <i>Examples:</i> citizen involvement in political processes, freedom of speech, freedom of association...
Cluster 3: Democracy and Governance in Canada—9.3.3: Living in an Industrialized Consumer Society.
VE-017: Be willing to consider the impact of their consumer choices.
KE-051: Analyze possible consequences of their consumer choices.
Cluster 4: Democracy and Governance in Canada—9.4.4: Taking our Place in the Global Village
KL-028: Evaluate Canadian concerns and commitments regarding environmental stewardship and sustainability.
KG-042: Describe Canada’s responsibilities and potential for leadership regarding current global issues. <i>Examples:</i> refugees, international development, environmental stewardship, military defence...
KP-047: Identify opportunities and challenges regarding Canadian-American relationships. <i>Examples:</i> protection of national sovereignty, trade, defence, environment...
VL-007: Be willing to make personal choices to sustain the environment.

General Learning Outcomes (GLO)

The SLOs **KC-013** and **KC-013A** do not appear in the GLO section. They are found in **Core Concept: Citizenship**. *Students will develop the knowledge, skills, and values necessary to become responsible democratic citizens who are actively engaged in their local, national, and global communities.*

KL-028, VL-007: The Land: Places and People: Students explore the dynamic relationships of people with the land, places, and environments.

VP-015, KP-047: Power and Authority: Students explore the processes and structures of power and authority, and their implications for individuals, relationships, communities, and nations.

VE-017, KE-051, VE-017: Economics and Resources: *Students will explore the distribution of resources and wealth in relation to individuals, communities, nations, and the natural environment.*

KG-042: Global Interdependence: Students explore the global interdependence of people, communities, societies, nations, and environments.

Grade 10

Source: Grade 10 (Senior 2) Social Studies: *Geographic Issues of the 21st Century: Manitoba Curriculum Framework of Outcomes and A Foundation for Implementation*, 2007. www.edu.gov.mb.ca/k12/cur/socstud/frame_found_sr2/index.html.

Specific Learning Outcomes (SLO)

Cluster 1: Geographic Literacy—1.5 Why Care?
KL-018: Explain the importance of stewardship in the preservation of the Earth’s complex environment.
VL-005: Respect the Earth as a complex environment in which humans have important responsibilities.
S-103: Promote actions that reflect principles of sustainability.
S-107: Make decisions that reflect social responsibility.
Cluster 2: Natural Resources—2.3: Sustainable Development
KC-002: Describe sustainability issues related to natural resource extraction and consumption.
VP-009: Be willing to consider the implications of personal choices regarding natural resources.
S-103: Promote actions that reflect principles of environmental stewardship and sustainability.
Cluster 3: Food from the Land—3.1: Area and Conditions
KL-023: Describe the impact of various agricultural practices on the physical environment. <i>Examples:</i> soil erosion, water quality, soil fertility...
VL-005: Respect the Earth as a complex environment in which humans have important responsibilities.
S-103: Promote actions that reflect principles of environmental stewardship and sustainability.
Cluster 3: Food from the Land—3.2: Food Production
KH-034: Give examples of ways in which food production has changed over time. <i>Examples:</i> soil conservation strategies, technological change...
Cluster 3: Food from the Land—3.3: Safeguarding Our Food Supply
VL-005: Respect the Earth as a complex environment in which humans have important responsibilities.
VL-006: Be willing to consider the environmental consequences of their food choices.
S-103: Promote actions that reflect principles of environmental stewardship and sustainability.

S-107: Make decisions that reflect social responsibility.
Cluster 3: Food from the Land—3.4
S-107: Make decisions that reflect social responsibility.
S-405: Articulate their perspectives on issues.
Cluster 4: Industry and Trade—4.3: Globalization
VG-008: Be willing to consider the social and environmental impacts of their consumer choices.
Cluster 5: Urban Places—5.3: Environmental and Economic Issues
S-107: Make decisions that reflect social responsibility.
Cluster 5: Urban Places—5.4: The Impact of Urbanization
S-103: Promote actions that reflect principles of environmental stewardship and sustainability.
S-107: Make decisions that reflect social responsibility.

General Learning Outcomes (GLO)

The SLO **KC-022** does not appear in the GLO section. It is found in **Core Concept: Citizenship**. *Students will develop the knowledge, skills, and values necessary to become responsible democratic citizens who are actively engaged in their local, national, and global communities.*

The SLOs **S-103**, **S-107**, and **S-405** do not appear in the GLO section. They are found in the Skills for Active Democratic Citizenship section.

KL-018, VL-005, KL-023, VL-006: The Land: Places and People: Students will explore the dynamic relationships of people with the land, places, and environments.

KH-034: Historical Connections: Students will explore how people, events, and ideas of the past shape the present and influence the future.

VP-009: Power and Authority: Students will explore the processes and structures of power and authority, and their implications for individuals, relationships, communities, and nations.

Grade 11 History of Canada

Source: Grade 11 Social Studies: *History of Canada Framework Chart*, 2011.
www.edu.gov.mb.ca/k12/cur/socstud/history_gr11/index.html

Specific Learning Outcomes (SLO)

There are not any direct connections between solid waste and the specific learning outcomes of Grade 11 Social Studies: *History of Canada Framework Chart* (2011) or Grade 11 Social Studies: *History of Canada Clusters and Learning Experience*.



Grade 12 Global Issues: *Citizenship and Sustainability (40S)*

Source: Grade 12 Global Issues: *Citizenship and Sustainability (40S)*, 2011.
www.edu.gov.mb.ca/k12/cur/socstud/global_issues/index.html.

There are 10 suggested areas of inquiry for Grade 12 Global Issues: *Citizenship and Sustainability (40S)*.

Area of Inquiry: Consumerism

Consumer-based economies; capitalism and free market economies; citizen responsibilities and decision-making; corporate responsibilities and decision-making; culture of entitlement; culture of credit; culture of excess; commodification of indigenous cultures; impact of branding, marketing and advertising; mass media manipulation; corporate sponsorship, product placement; perceived/planned obsolescence; lifestyle and health issues (e.g., obesity, chemical intolerances, allergies, illnesses, sedentary living); energy and natural resource depletion; generation of waste; petro-politics; corporate and consumer greed; sweatshops; etc.

Area of Inquiry: Environment

Healthy ecosystems, preservation of biodiversity; water management and quality; limited resources vs. unlimited development/growth; responsible resource extraction; energy efficiency and alternative energy sources; environmental and human disasters (prevention, response, individual and collective); environmental degradation and technological solutions; sustainable cities, design, urban planning; alternative transportation; standard of living vs. quality of life; carrying capacity; energy consumption, carbon footprint, travel and transportation alternatives, alternative energy sources; stewardship and equitable sharing of natural resources; economic and environmental refugees; population increase, distribution, movement, migration, urbanization; politics and economics of climate change (e.g., impact of industrialization, responsibilities of developed/less developed economies, Kyoto Accord; Arctic sovereignty); Gaia hypothesis, systems thinking, interconnectedness of human and natural systems, living sustainably, etc.

Take Action

The items below are found in the Take Action part of the Overview. They could be applied to solid waste issues.

Minimize your ecological footprint, and live more responsibly (e.g., use fewer non-renewable resources; reduce waste; limit dependence on petrochemicals; seek sustainable and ethical food choices...).

Recognize the consequences of your decisions, and take action as a citizen for a sustainable and just future for all.

Be an ethical decision-maker, take a stand to support quality of life for all, and challenge the unethical and the unsustainable.



Make consumption decisions that follow ecological and ethical principles, and be respectful of nature, self, and society in your actions.

Support democratic citizenship and be vigilant about political decisions that affect social, economic, and environmental conditions.

Grade 12 Current Topics in First Nations, Métis and Inuit Studies: A Foundation for Implementation (2011)

Source: *Grade 12 Current Topics in First Nations, Métis, and Inuit Studies: A Foundation for Implementation*. 2011. www.edu.gov.mb.ca/k12/abedu/foundation_gr12/index.html.

There are not any direct connections between solid waste and the learning experiences of *Grade 12 Current Topics in First Nations, Métis, and Inuit Studies: A Foundation for Implementation* (2011).

There is one direct reference to waste in the Blackline Master 1.3.7: First Nations Worldview 1800s. A section of the Economic View is “Waste is disrespectful and harmful to all.”

Physical Education/Health Education

Note: The latest information on Physical Education/Health Education courses is available at www.edu.gov.mb.ca/k12/cur/physhlth/index.html. The information in this document was valid as of September 29, 2014.

The following Physical Education/Health Education curricula were examined to find potential learning outcomes connected to the term solid waste and related terms. Related terms included procurement, recycling, composting, environmentally sustainable, sustainable development, and sustainability.

A more detailed explanation of selection criteria is given in the Selection Rational section at the beginning of the document.

Physical Education/Health Education Documents Reviewed

K-4 Physical Education/Health Education: A Foundation for Implementation, 2000

Grades 5-8 Physical Education/Health Education: A Foundation for Implementation, 2002

Grades 9 & 10 (Senior 1 & 2) Physical Education/Health Education: A Foundation for Implementation, 2004

Grade 11 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation, 2008



Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation, 2009

General Learning Outcomes

General student learning outcomes are broad statements identifying the knowledge, skills, and attitudes that students are expected to demonstrate with increasing competence and confidence from Kindergarten to Senior 4. (*K-4 Physical Education/Health Education: A Foundation for Implementation, 2000. p 16.*)

Specific Learning Outcomes

Specific learning outcome (SLO) statements define what students are expected to achieve by the end of the grade. (*Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation, 2009. p 62.*)

Attitude Indicators

Attitude indicators represent the desired beliefs, feelings, or values for leading physically active and healthy lifestyles. However, developing positive attitudes toward active and healthy living goes beyond what is learned in physical education/health education. Attitude development is a lifelong process that involves the schools, parents, families, communities, and society at large. (*K-4 Physical Education/Health Education: A Foundation for Implementation, 2000. p 17.*)

The attitude indicator statements are outlined at the end of each GLO section of each grade. (*K-4 Physical Education/Health Education: A Foundation for Implementation, 2000. p 17.*)

Some SLOs are directly connected to solid waste issues.

Physical Education/Health Education courses are rich in problem-solving learning outcomes. The problem-solving skills do not specifically mention waste; however, the skills could be applied to solid waste issues. A number of the Physical Education/Health Education learning outcomes provide the personal and social management skills that are needed to identify solid waste issues, propose solutions, and initiate action.

Kindergarten

Source: *K-4 Physical Education/Health Education: A Foundation for Implementation, 2000.*
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/index.html.



Specific Student Learning Outcomes (SLO)

Attitude Indicator: 1. Movement, 2. Fitness Management, 3. Safety, 4. Personal, 5. Social Management

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

Attitude Indicator

1.6 is connected with each of the five GLOs.

GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

GLO 2: Fitness Management—The student will demonstrate the ability to develop and follow a personal fitness plan for lifelong physical activity and well-being.

GLO 3: Safety—The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.

GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

GLO 5: Healthy Lifestyle Practices—The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.

Grade 1

Source: *K-4 Physical Education/Health Education: A Foundation for Implementation*, www.edu.gov.mb.ca/k12/cur/physhlth/foundation/index.html.

Specific Student Learning Outcomes (SLO)

Attitude Indicator: 1. Movement, 2. Fitness Management, 3. Safety, 4. Personal, 5. Social Management

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

Attitude Indicator

1.6 is connected with each of the five GLOs.



GLO 1: Movement: The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

GLO 2: Fitness Management: The student will demonstrate the ability to develop and follow a personal fitness plan for lifelong physical activity and well-being.

GLO 3: Safety: The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.

GLO 4: Personal and Social Management: The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

GLO 5: Healthy Lifestyle Practices: The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.

Grade 2

Source: *K-4 Physical Education/Health Education: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/index.html.

Specific Student Learning Outcomes (SLO)

Attitude Indicator: 1. Movement, 2. Fitness Management, 3. Safety, 4. Personal, 5. Social Management

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

Attitude Indicator

1.6 is connected with each of the five GLOs.

GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

GLO 2: Fitness Management—The student will demonstrate the ability to develop and follow a personal fitness plan for lifelong physical activity and well-being.

GLO 3: Safety—The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.

GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.



GLO 5: Healthy Lifestyle Practices—The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.

Grade 3 Physical Education/Health Education

Source: *K-4 Physical Education/Health Education: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/index.html.

Specific Student Learning Outcome (SLO)

4. Personal and Social Management

K.4.3.A.3: Explore the steps in the decision-making/problem-solving process. (e.g., define topic or issue, explore alternatives, check and consider health knowledge and values, identify possible solutions, decide, evaluate...).

Attitude Indicator: 1. Movement, 2. Fitness Management, 3. Safety, 4. Personal, 5. Social Management

1.6 Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.4.3.A.3: GLO 4—Personal and Social Management: The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

Attitude Indicator

1.6 is connected with each of the five GLOs.

GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

GLO 2: Fitness Management—The student will demonstrate the ability to develop and follow a personal fitness plan for lifelong physical activity and well-being.

GLO 3: Safety—The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.

GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

GLO 5: Healthy Lifestyle Practices—The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.

Grade 4 Physical Education/Health Education

Source: *K-4 Physical Education/Health Education: A Foundation for Implementation*, 2000.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/index.html

Specific Student Learning Outcomes (SLO)

4. Personal and Social Management
K.4.4.A.2a: Identify a goal-setting process (e.g., assess attributes, set goals, visualize, practise, monitor, automate, enjoy...) for establishing personal goals.
K.4.4.A.3: Identify the steps of the decision-making/problem-solving process with an emphasis on the final steps (e.g., making the decision, taking action, evaluating results...).
K.4.4.B.1a: Identify appropriate social behaviours (e.g., speaking kindly, acknowledging others' ideas and opinions, offering to help...) toward others in small-group situations.
K.4.4.B.2b: Identify ways (e.g., assign and accept responsibility for roles in an activity, celebrate successes of self and others, say "please/thank you"...) to get along with others in cooperative/collaborative situations.
S.4.4.A.2: Design, implement, evaluate, and revise an action plan for making a group decision (e.g., classroom rules and routines, planning a class or group activity...).
S.4.4.A.3: Demonstrate interpersonal skills (i.e., ability to communicate verbally and non-verbally with others, work cooperatively and collaboratively, show respect and consideration for rights and feelings of others, be responsible for self and others) for getting along with others in class activities.
Attitude Indicator: 1. Movement, 2. Fitness Management, 3. Safety, 4. Personal, 5. Social Management
1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.4.4.A.2a, K.4.4.A.3, K.4.4.B.1a, K.4.4.B.2b, S.4.4.A.2, S.4.4.A.3: GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

Attitude Indicator

1.6 is connected with each of the five GLOs.

GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

GLO 2: Fitness Management—The student will demonstrate the ability to develop and follow a personal fitness plan for lifelong physical activity and well-being.

GLO 3: Safety—The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.



GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

GLO 5: Healthy Lifestyle Practices—The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.

Grade 5 Physical Education/Health Education

Source: *Grades 5-8 Physical Education/Health Education: A Foundation for Implementation*, 2002.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/5-8/index.html.

Specific Student Learning Outcomes (SLO)

4. Personal and Social Management
K.4.5.A.2b: Describe the importance of self-regulation and taking responsibility for one's own actions (e.g., gain the respect of others, personal achievement, quality of life, active participation, being a good team player...) for personal success.
K.4.5.A.3: Identify the influence of self (e.g., personal goals, emotions...) and others (e.g., expectations of family, teachers, friends; values and beliefs of home, religion, culture, community, society in general...) on setting priorities and making responsible personal decisions (e.g., academic achievement, leisure activities...).
S.4.5.A.1: Use a goal-setting process to set and monitor progress for a group goal (e.g., project work, gymnastic routine, prediction run...).
S.4.5.A.2: Demonstrate the ability to set priorities for possible solutions that show responsible decision making for physically active and healthy living choices.
S.4.5.A.3: Demonstrate functional use of interpersonal skills (e.g., listen attentively, summarize information, clarify feelings, abstain from put-downs, be encouraging, play fairly, be inclusive, show non-aggressive behaviour, resist negative influences...) for getting along with others in making group decisions while participating in class activities.
S.4.5.A.4: Demonstrate ways (e.g., compromising, accommodating, reaching consensus, recognizing who holds the power/authority, developing an understanding of issues, forecasting positive long-term results...) to turn conflict into a win-win situation in different case scenarios (e.g., disagreement with a friend or classmate...).
Attitude Indicator: GLO 1. Movement
1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.4.5.A.2b, K.4.5.A.3, S.4.5.A.1, S.4.5.A.2, S.4.5.A.3, S.4.5.A.4: GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.



Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

Grade 6 Physical Education/Health Education

Source: *Grades 5-8 Physical Education/Health Education: A Foundation for Implementation*, 2002.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/5-8/index.html.

Specific Student Learning Outcomes (SLO)

4. Personal and Social Management

K.4.6.A.2b: Determine effective time-management techniques and organizational skills (e.g., making lists, setting priorities...) for personal planning (e.g., preparing for tests, examinations, projects, competitions...).

K.4.6.B.1b: Recognize personal participation and responsibility (e.g., respect for and acceptance of individual differences, awareness of social norms and values, concern and compassion for others, cooperation, motivation to solve interpersonal problems...) in different social contexts.

K.4.6.B.2b: Identify the behaviours (e.g., showing respect, fulfilling a commitment, abstaining from put-downs, helping others who are experiencing difficulty, following directions, being encouraging...) that are important for working cooperatively and collaboratively with others.

S.4.6.A.2: Determine positive and negative consequences of possible solutions as part of the decision-making/problem-solving process for making healthy living choices.

GLO 5. Healthy Lifestyle Practices

K.5.6.A.2: Identify practices and policies that support healthy schools and communities (e.g., school code of conduct, adequate supervision, school and community activities, labeling of hazardous products, evacuation procedures, fluoride treatment of drinking water, public health services...).

Attitude Indicator 1. Movement

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.4.6.A.2b, K.4.6.B.1b, K.4.6.B.2b, S.4.6.A.2: GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

K.5.6.A.2: GLO 5: Healthy Lifestyle Practices—The student will demonstrate the ability to make informed decisions for healthy living related to personal health practices, active living, healthy nutritional practices, substance use and abuse, and human sexuality.



Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

Physical Education/Health Education Grade 7

Source: *Grades 5-8 Physical Education/Health Education: A Foundation for Implementation*, 2002.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/5-8/index.html.

Specific Student Learning Outcomes (SLO)

Attitude Indicator 1. Movement

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Learning Outcomes (GLO)

Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

Physical Education/Health Education Grade 8

Source: *Grades 5-8 Physical Education/Health Education: A Foundation for Implementation*, 2002.
www.edu.gov.mb.ca/k12/cur/physhlth/foundation/5-8/index.html.

Specific Student Learning Outcomes (SLO)

Attitude Indicator 1. Movement

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.



Physical Education/Health Education Grade 9

Source: *Grades 9 & 10 (Senior 1 & 2) Physical Education/Health Education: A Foundation for Implementation*, 2004. www.edu.gov.mb.ca/k12/cur/physhlth/foundation_s1-2/index.html.

Specific Student Learning Outcomes (SLO)

4. Personal and Social Management

K.4.S1.b.3c: Assess behaviours and conflict-resolution strategies (i.e., negotiation, arbitration, and adjudication) in the context of final outcome (i.e., win/win, win/lose, lose/lose) for settling disputes or disagreements.

Attitude Indicator 1. Movement

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.4.S1.b.3c: GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

Physical Education/Health Education Grade 10

Source: *(Grades 9 & 10) Senior 1 & 2 Physical Education/Health Education: A Foundation for Implementation*, 2004. www.edu.gov.mb.ca/k12/cur/physhlth/foundation_s1-2/index.html.

Specific Student Learning Outcomes (SLO)

3. Safety

K.3.S2.B.4: Investigate the contributions self and/or others can make to community/global health and sustainable development (i.e., maintaining safe and healthy lifestyle practices, volunteering, reducing, reusing, recycling).

4. Personal and Social Management

S.4.S2.A.2: Design, implement, evaluate, and revise an action plan for making a personal and/or group decision based on values and beliefs.

S.4.S2.A.3: Apply communication skills and strategies (e.g., listen actively, clarify feelings, summarize...) in case scenarios for getting along with others in a variety of contexts (e.g., while participating in physical activities, discussion groups, project work, job interviews, conversations with adults in home/school/community...)*



Attitude Indicator: GLO 1: Movement

1.6: Appreciate and respect the natural environment while participating in physical activity.

General Student Learning Outcomes (GLO)

K.3.S2.B.4: GLO 3: Safety—The student will demonstrate safe and responsible behaviours to manage risks and prevent injuries in physical activity participation and in daily living.

S.4.S2.A.2, S.4.S2.A.3: GLO 4: Personal and Social Management—The student will demonstrate the ability to develop self-understanding, to make health-enhancing decisions, to work cooperatively and fairly with others, and to build positive relationships with others.

Attitude Indicator

1.6: GLO 1: Movement—The student will demonstrate competency in selected movement skills, and knowledge of movement development and physical activities with respect to different types of learning experiences, environments, and cultures.

*One of the suggested scenarios for **S.4.S2.A.3** is “In English language arts class, your work group has been asked to develop a plan to reduce waste at school. Not everyone in your class feels that reducing waste is an important issue.” (*Senior 1 & 2 Physical Education/Health Education: A Foundation for Implementation*, 2004. p S2 114.

Physical Education/Health Education Grade 11

Source: *Grade 11 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation*, 2008.
www.edu.gov.mb.ca/k12/cur/physhlth/frame_found_gr11/index.html.

There are not any direct connections between solid waste and the learning outcomes of *Grade 11 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation* (2008).

Physical Education/Health Education Grade 12

Source: *Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation*, 2009.
www.edu.gov.mb.ca/k12/cur/physhlth/frame_found_gr12/index.html.

There are not any direct connections between solid waste and the learning outcomes of *Grade 12 Active Healthy Lifestyles: Manitoba Physical Education/Health Education Curriculum Framework of Outcomes and A Foundation for Implementation* (2009).



However, Module D: Personal and Social Development (pp 173–205) has information concerning group function stages and leadership skills. The information may be useful in group work to identify solid waste issues, propose solutions, and take action.

Technology Education

Note: The latest on the implementation dates for new curricular credits and the discontinuation of old courses can be found at www.edu.gov.mb.ca/k12/cur/teched/sy_tech_program.html. The information in this document was valid as of September 29, 2014.

The following technology vocational curricula were examined to find potential learning outcomes connected to the term solid waste and related terms. Major related terms included procurement, recycling, composting. Additional terms that could have connections to solid waste include environment sustainable, sustainability, cradle to cradle. The WHMIS, ISO 14000, R 2000, and LEED programs also contain connections to solid waste.

In technology education, the “emerging trends” goals may also encompass connections to solid waste.

A more detailed explanation of selection criteria is given in the Selection Rational section at the beginning of the document.

Technology Documents Reviewed

The first two documents are support documents. They are included as they have information related to solid waste.

Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers, 2003

The Middle Years Home Economics/Industrial Arts: Linking Living to Learning: A Support Document for Teachers, 2003

Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes, 2004

Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes, 2009

Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes, August 2014 – Unedited Draft

Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2013

Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014

Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014



Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, July 2012–Unedited Draft

Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014

Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes, 2014

General Learning Outcomes

In technology education, “General learning outcomes (GLOs) are overarching statements about what students are expected to learn in each course. They identify the broad categories of knowledge, skills, and attitudes that students are expected to learn and are able to demonstrate in a subject area or course.” (Technical-Vocational Education Overview, 2013. p 8.)

Specific Learning Outcomes

In technology education, “Specific learning outcomes (SLOs) are statements that identify the specific knowledge, skills, and understandings that students are required to attain by the end of a given course. Teachers must teach and assess every SLO in each course.” Technical-Vocational Education Overview, 2013. p 10.)

Home Economics and Industrial Arts

Home Economics and Industrial Arts Middle Years

“Middle Years education can be categorized from Grades 5 to 8 or Grade 6 to Senior 1, depending on the educational setting. It is for this reason that four levels of learning outcomes (exploratory, introductory, intermediate, and advanced) that are not grade-specific have been outlined in this document.” (*Middle Years Home Economics/Industrial Arts: Linking Living to Learning: A Support Document for Teachers*, 2003, p 69.)

Home Economics and Industrial Arts—Grades 5 to 9 or 6 to 9

Source: *The Middle Years Home Economics/Industrial Arts: Linking Living to Learning: A Support Document for Teachers*, 2003. www.edu.gov.mb.ca/k12/cur/teched/home_ec/index.html.



Specific Learning Outcomes (SLO)

Intermediate
2. Identify environmental and workplace impacts on the use of hazardous materials.
Advanced
2. Analyze the environmental impact of the use of hazardous materials.

General Learning Outcomes (GLO)

Intermediate 2. Advanced 2. To demonstrate safe practices with tools, machines, materials, and related processes.

Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers, 2003.
www.edu.gov.mb.ca/k12/cur/teched/ia_safe.html.

This document provides information on the handling of waste related to education technology courses. The following are the specific connections to solid waste in the document.

Note: The document is not laid out in an SLO and GLO format. It uses a number of different headings.

Headings and Related Items

Responsibilities of Maintenance
To provide for the timely collection and disposal of scrap materials and waste.
Inspection
Housekeeping: Material storage, waste disposal, floor and counters should be neat and tidy
B Housekeeping
7. An approved metal container is provided for waste and oily rags.
Hazardous Material Inspection
Leaks and Spills*
7. Cleaning procedures are explained thoroughly and followed?
8. Waste disposal procedures are adequate and followed?
Material Safety Data Sheet
Section 7 Preventative Measures
WASTE DISPOSAL: Disposal must meet with local requirements. Waste must never be discharged directly into sewers or surface waters. (Neutralize and dilute with much water.)
Safety Equipment
Oily Waste Containers: The rags used to apply wood finishes should be placed in an oily waste container. Rags filled with solvents, oil, and other chemicals will also be placed in these safety containers. These containers should be used for disposal of material with solvents or oils only. Never use them for papers, gum wrappers or other trash which they were not meant for.

* Note: While the spill material may be a liquid, the cleaning procedures often involve solid waste materials that need to be disposed of properly.

Senior Years Family Studies

Home Economics—Grade 9 (Senior 1)

Source: *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes*, 2004.
www.edu.gov.mb.ca/k12/cur/teched/fs_framework/index.html.

There are not any listed direct connections between solid waste and the specific learning outcomes of *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes* (2004) for Grade 9.

Home Economics—Grade 10 (Senior 2)

Source: *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes*, 2004.
www.edu.gov.mb.ca/k12/cur/teched/fs_framework/index.html.

Specific Learning Outcomes (SLO)

3.1: Human Needs

S2 3.1.4: Determine environmental and economic issues related to children's clothing (e.g., cloth vs. disposable diapers, unisex clothing, second-hand clothing).

General Learning Outcomes (GLO)

S2 3.1.4: GLO 3: Caregiving through the Life Cycle Needs of Infants/Children

Home Economics—Grade 11 (Senior 3)

Source: *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes*, 2004.
www.edu.gov.mb.ca/k12/cur/teched/fs_framework/index.html.

There are not any direct connections between solid waste and the specific learning outcomes of *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes* (2004) for Grade 11.

Home Economics—Grade 12 (Senior 4)

Source: *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes*, 2004.
www.edu.gov.mb.ca/k12/cur/teched/fs_framework/index.html.

There are not any direct connections between solid waste and the learning outcomes of *Senior Years Family Studies: Manitoba Curriculum Framework of Outcomes* (2004) for Grade 12.

Senior Years Industrial Arts

Industrial Arts—Grade 9

Source: *Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes*, 2009.
www.edu.gov.mb.ca/k12/cur/teched/ia_framework/index.html.

The problem-solving skills do not specifically mention waste; however, the skills could be applied to a solid waste problem encountered in production or in designing products that are easily recyclable (cradle to cradle).

The design process in Appendix B relates to the production of a product and does not mention waste; however, the process could be applied to designing a product so that less solid waste is produced and/or the waste produced becomes a feedstock for another product.

Specific Learning Outcomes (SLO)

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Fundamental Skills

IA9.F2.1: Demonstrate an understanding of the problem solving process in designing and producing a product.

IA9.F2.2: Identify criteria for making and evaluating choices.

IA9.F2.3: Demonstrate an understanding of the qualities of good design.

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Personal Skills

IA9.P2.2: Demonstrate an understanding of technological impact on the environment, society, lifestyles, etc.

IA9.P4.1: Follow personal and environmental health and safety procedures.

IA9.P4.2: Identify immediate hazards and their impact on self, others, and the environment.

IA9.P4.3: Identify and follow appropriate emergency response procedures.

Power Mechanics Technology—Production Skills

IA9.PM9.1: Identify several current innovations in the automotive industry such as continuously variable transmissions, advanced suspension systems, modular vehicle assembly, use of new materials...

IA9.PM9.2: Identify several current issues and innovation regarding the automotive industry and environmental impact such as emission issues, energy consumption, sustainable development...

Woodwork Technology Production Skills

IA9.WW6.2: Explain the environmental impact of most common wood-finishing processes.



General Learning Outcomes (GLO)

IA9.F2.2, IA9.F2.2, IA9.F2.3: GLO F2: Problem Solving—Apply effective decision-making, problem-solving, and design strategies to a project.

IA9.P2.2: GLO P2: Ethical Decision Making—Make ethical decisions concerning the impact of one's activities and the use of technology.

IA9.P4.1, IA9.P4.2, IA9.P4.3: GLO P4: Safe Practices—Demonstrate safe practices with tools, machines, materials, and related processes. (Refer to: *Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers*, Manitoba Education and Youth, 2003.)

IA9.PM9.1, IA9.PM9.2: GLO PM9: Environmental Impact and Current Innovations—Demonstrate an understanding of current innovation in automotive industry, environmental impacts, and emerging new technologies.

IA9.WW6.2: GLO WW6: Finishing—Apply finishing processes to wood considering their environmental impact.

Industrial Arts—Grade 10 (Senior 2)

Source: *Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes*, 2009.
www.edu.gov.mb.ca/k12/cur/teched/ia_framework/index.html.

The problem-solving skills do not specifically mention waste; however the skills could be applied to a solid waste problem encountered in production or designing products that are easily recyclable.

The design process in Appendix B relates to the production of a product and does not mention waste; however, the process could be applied to designing a product so that less solid waste is produced and/or the waste produced becomes a feedstock for another product.

Specific Learning Outcomes (SLO)

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Fundamental Skills

IA10.F2.1: Identify problems and apply appropriate problem-solving skills to solve them.

IA10.F2.2: Apply a decision making strategy to practical situations.

IA10.F2.3: Modify an existing design to meet specified criteria.

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Personal Skills

IA10.P2.2: Demonstrate an understanding of the impact of technological choices.

IA10.P4.1: Recognize and follow personal and environmental health and safety procedures.

IA10.P4.2: Identify immediate and potential hazards and their impact on self, others, and the environment.

IA10.P4.3: Identify and follow appropriate emergency response procedures.

Power Mechanics Technology—Production Skills

IA10.PM9.1, IA9.PM9.1: Identify several current innovations in the automotive industry such as continuously variable transmissions, advanced suspension systems, modular vehicle assembly, use of new materials...

IA10.PM9.2, IA9.PM9.2: Identify several current issues and innovations regarding the automotive industry and environmental impact such as emission issues, energy consumption, sustainable development...

Woodworking Technology —Production Skills

I IA10.WW6.2, A9.WW6.2: Explain the environmental impact of most common wood-finishing processes.

General Learning Outcomes (GLO)

IA10.F2.1, IA10.F2.2, IA10.F2.3: GLO F2: Problem Solving—Apply effective decision-making, problem-solving, and design strategies to a project.

IA10.P2.2: GLO P2: Ethical Decision Making—Make ethical decisions concerning the impact of one’s activities and the use of technology.

IA10.P4.1, IA9.P4.2, IA9.P4.3: GLO P4: Safe Practices—Demonstrate safe practices with tools, machines, materials, and related processes. (Refer to: *Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers*, Manitoba Education and Youth, 2003.)

I IA10.WW6.2, IA9.WW6.2: GLO WW6: Finishing—Apply finishing processes to wood considering their environmental impact.

Industrial Arts—Grade 11 (Senior 3)

Source: *Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes*, 2009.
www.edu.gov.mb.ca/k12/cur/teched/ia_framework/index.html.

The problem-solving skills do not specifically mention waste; however, the skills could be applied to a solid waste problem encountered in production or in designing products that are easily recyclable.

The design process in Appendix B relates to the production of a product and does not mention waste; however, the process could be applied to designing a product so that less solid waste is produced and/or the waste produced becomes a feedstock for another product.

Specific Learning Outcomes (SLO)

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Fundamental Skills

IA11.F2.1: Transfer problem-solving skills to real life situations.

IA11.F2.2: Use a variety of critical thinking skills to evaluate situations and make decisions.

IA11.F2.3: Create a design to meet a set of specifications.

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Personal Skills

IA11.P2.1: Assess the implications of personal/group actions within the broader community.

IA11.P2.2: Develop and implement risk management strategies for a variety of technological activities.

IA11.P4.1: Establish and follow personal and environmental health and safety procedures.

IA11.P4.2: Identify immediate and potential hazards and assess their impact on self, others, and the environment.

IA11.P4.3: Identify and follow appropriate emergency response procedures.

Power Mechanics Technology—Production Skills

IA11.PM9.1, IA9.PM9.1: Identify several current innovations in the automotive industry such as continuously variable transmissions, advanced suspension systems, modular vehicle assembly, use of new materials...

IA11.PM9.2, IA9.PM9.2: Identify several current issues and innovations regarding the automotive industry and environmental impact such as emission issues, energy consumption, sustainable development...

I IA11.WW6.2, A9.WW6.2: Explain the environmental impact of most common wood-finishing processes.

General Learning Outcomes (GLO)

IA11.F2.1, IA11.F2.2, IA11.F2.3: GLO F2: Problem Solving—Apply effective decision-making, problem-solving, and design strategies to a project.

IA11.P2.1, IA11.P2.2: GLO P2: Ethical Decision Making—Make ethical decisions concerning the impact of one’s activities and the use of technology.

IA11.P4.1, IA11.P4.2, A11.P4.3: GLO P4: Safe Practices—Demonstrate safe practices with tools, machines, materials, and related processes. (Refer to: *Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers*, Manitoba Education and Youth, 2003.)

IA11.PM9.1, IA11.PM9.2: GLO PM9: Environmental Impact and Current Innovations—Demonstrate an understanding of current innovation in automotive industry, environmental impacts, and emerging new technologies.

I IA11.WW6.2, IA9.WW6.2: GLO WW6: Finishing—Apply finishing processes to wood considering their environmental impact.

Industrial Arts—Grade 12 (Senior 4)

Source: *Senior Years Industrial Arts: Manitoba Curriculum Framework of Outcomes*, 2009.
www.edu.gov.mb.ca/k12/cur/teched/ia_framework/index.html.

The problem-solving skills do not specifically mention waste; however, the skills could be applied to a solid waste problem encountered in production or designing products that are easily recyclable.



The design process in Appendix B relates to the production of a product and does not mention waste; however, the process could be applied to designing a product so that less solid waste is produced and/or the waste produced becomes a feedstock for another product.

Specific Learning Outcomes (SLO)

Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Fundamental Skills
IA12.F2.1: Research and articulate a problem that can be solved through technological means.
IA12.F2.2: Apply problem-solving and design skills to develop a technological solution to a problem.
IA12.F2.3: Analyze critically and act logically to evaluate situations and make decisions.
Drafting Design Technology, Electricity/Electronic Technology, Graphic Communication Technology, Metalwork Technology, Power Mechanics Technology, Woodwork Technology—Personal Skills
IA12.P2.1: Analyze the implications of personal/group actions within the global context.
IA12.P2.3: Demonstrate responsible leadership in managing current and future technologies on the environment and on society.
IA12.P4.1: Transfer and apply personal and environmental health and safety procedures to a variety of environments and situations.
IA12.P4.2: Identify immediate and potential hazards and assess their impact on self, others, and the environment, and recommend safe procedures.
IA12.P4.3: Identify and follow appropriate emergency response procedures.
Power Mechanics Technology—Production Skills
IA12.PM9.1: Research, explain, and demonstrate several current innovations in the automotive industry.
IA12.PM9.2: Research, explain, and demonstrate several current issues and innovations regarding the automotive industry and environmental impact.
Woodworking Technology—Production Skills
I IA12.WW6.2, IA9.WW6.2: GLO WW6: Finishing—Apply finishing processes to wood considering their environmental impact.

General Learning Outcomes (GLO)

IA12.F2.1, IA12.F2.2, IA12.F2.3: GLO F2: Problem Solving—Apply effective decision-making, problem-solving, and design strategies to a project.

IA12.P2.1, IA12.P2.3: GLO P2: Ethical Decision Making—Make ethical decisions concerning the impact of one’s activities and the use of technology.

IA12.P4.1, IA12.P4.2, IA12.P4.3: GLO P4: Safe Practices—Demonstrate safe practices with tools, machines, materials, and related processes. (Refer to: *Keeping Your Facilities SAFE: A Support Document for Industrial Arts Teachers*, Manitoba Education and Youth, 2003.)



IA12.PM9.1, IA12.PM9.2: GLO PM9: Environmental Impact and Current Innovations— Demonstrate an understanding of current innovation in automotive industry, environmental impacts, and emerging new technologies.

I IA12.WW6.2, IA9.WW6.2: GLO WW6: Finishing—Apply finishing processes to wood considering their environmental impact.

Senior Years Technology Education Program

Automotive Technology

Automotive Technology—Grade 9

8695: *Introduction to Automotive Technology* 15S/15E/15M, 10S/10E/10M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.

Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).

Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.

Goal 5: Demonstrate understanding of sustainability.

Identify the automotive service and repair industry’s sustainability practices and impact on the environment.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an awareness of the evolution, technological progression, and emerging trends in automotive technology.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.



Automotive Technology—Grade 10

8696: *Automotive Systems & Service* 20S/20E/20M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.
Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).
Follow safe Practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.
Goal 5: Demonstrate understanding of sustainability.
Describe and apply efficient materials usage and disposal practices.
Goal 9: Explore evolution, technological progression, and emerging trends.
Identify changes to vehicle design and their affect on safety, fuel economy, emissions, and vehicle performance.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

Automotive Technology—Grade 11

8697: *Engine Fundamentals & Service* 30S/30E/30M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.
Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).
Follow safe Practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.



Goal 5: Demonstrate understanding of sustainability.

Demonstrate an understanding of how and why lightweight and recyclable materials are used in vehicle production.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an understanding of the evolution, technological progression, and emerging trends in engine fundamentals and service.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

8698: Chassis Fundamentals & Service 30S/30E/30M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.

Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).

Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.

Goal 5: Demonstrate understanding of sustainability.

Identify recycling processes for materials.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an understanding of the evolution, technological progression, and emerging trends in chassis fundamentals and service.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.



8699: Drive Train Fundamentals & Service 30S/30E/30M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.

Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).

Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.

Goal 5: Demonstrate understanding of sustainability.

Demonstrate knowledge of efficient material usage to reduce waste and its impact on the environment.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an understanding of the evolution, technological progression, and emerging trends in drive train fundamentals and service.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

Automotive Technology—Grade 12

8700: Automotive Electrical Systems 40S/40E/40M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.

Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).

Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.

Goal 5: Demonstrate awareness of sustainability as it pertains to automotive technology.

Describe and apply efficient material usage and disposal practices.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an understanding of the evolution, technological progression, and emerging trends in automotive electric systems.

Describe emerging technologies related to automotive charging systems.

Describe emerging battery technology.

General Learning Outcomes (GLO)

GLO1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate an understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

8701: *Vehicle Systems Part 1* 40S/40E/40M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.

Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).

Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.

Goal 9: Explore evolution, technological progression, and emerging trends.

Demonstrate an understanding of the evolution, technological progression, and emerging trends in vehicle systems.

General Learning Outcomes (GLO)

GLO 1.1: Describe and apply appropriate health and safety practices.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

8702: *Vehicle Systems Part 2* 40S/40E/40M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.
Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).
Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.
Goal 5: Demonstrate awareness of sustainability as it pertains to automotive technology.
Describe the requirements and responsibilities for proper battery recycling.
Goal 9: Explore evolution, technological progression, and emerging trends.
Demonstrate an understanding of the evolution, technological progression, and emerging trends in vehicle systems.

General Learning Outcomes (GLO)

GLO1.1: Describe and apply appropriate health and safety practices.

GLO 5.1: Demonstrate an understanding of sustainability.

GLO 9.1: Explore evolution, technological progression, and emerging trends.

8703: *Applied Diagnostic Strategies* 40S/40E/40M

Source: *Grades 9 to 12 Automotive Technology: Manitoba Curriculum Framework of Outcomes – Unedited Draft*, August 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/automotive/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices.
Demonstrate awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS).
Follow safe practices and procedures for facilities, processes, materials, tools, and equipment used in an automotive shop.
Goal 9: Explore evolution, technological progression, and emerging trends.
Demonstrate an understanding of the evolution, technological progression, and emerging trends in diagnostic systems.
Explore emerging automotive technology.
Describe emerging vehicle safety technologies.
Explore material selection used in vehicle manufacturing.

General Learning Outcomes (GLO)

GLO1.1: Describe and apply appropriate health and safety practices.

GLO 9.1: Explore evolution, technological progression, and emerging trends.



Senior Years Technology Education Program

Culinary Arts

Culinary Arts—Grade 9

8790: Exploration of the Culinary Arts (9) 15S/15E/15M, 10S/10E/10M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

9.1.3.12: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

9.6.1.1: Identify the waste produced in a culinary arts facility.

9.6.1.2: Demonstrate the disposal and recycling of waste.

9.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

9.6.1.4: Identify and locate facilities for recycling and waste disposal.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry's sustainability practices and impact on the environment.

Culinary Arts Grade 10

8791: Cooking Principals (10) 20S/20E/20M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.



Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

10.1.3.12: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

10.6.1.1: Identify the waste produced in a culinary arts facility.

10.6.1.2: Demonstrate the disposal and recycling of waste.

10.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

10.6.1.4: Identify and locate facilities for recycling and waste disposal.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry's sustainability practices and impact on the environment.

Culinary Arts Grade 11

8792: Garde-Manager (11A) 30S/30E/30M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

11A.1.3.12: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

11A.6.1.1: Identify the waste produced in a culinary arts facility.

11A.6.1.2: Demonstrate the disposal and recycling of waste.

11A.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

11A.6.1.4: Identify and locate facilities for recycling and waste disposal.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

11A.10.1.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in garde-manger.



General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry’s sustainability practices and impact on the environment.

GLO 10.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

8793: Patisserie and Baking (11B) 30S/30E/30M

Source: *Grades 9 to 12 Culinary Arts Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014 www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

11B.1.3.12 Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

11B.6.1.1: Identify the waste produced in a culinary arts facility.

11B.6.1.4: Identify and locate facilities for recycling and waste disposal.

11B.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

11B.6.1.4: Identify and locate facilities for recycling and waste disposal.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

11B.10.1.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in patisserie and baking.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry’s sustainability practices and impact on the environment.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.



8794: Vegetables, Fungi, Starches, and Farinaceous Products (11C)
30S/30E/30M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

11C.1.3.12: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

11C.6.1.1: Identify the waste produced in a culinary arts facility.

11C.6.1.2: Demonstrate the disposal and recycling of waste.

11C.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

11C.6.1.4: Identify and locate facilities for recycling and waste disposal.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

11C.10.1.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in vegetables, fungi, starches, and farinaceous products.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry's sustainability practices and impact on the environment.

GLO 10.1: Demonstrate an understanding of the evolution and technical progression of, and the emerging trends in the culinary arts.

Culinary Arts Grade 12

8795: Stocks, Soups, and Sauces (12A) 40S/40E/40M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.



Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

12A.1.3.4: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

12A.6.1.2: Demonstrate the reduction of the usage of energy, waste, and water.

12A.6.1.3: Rotate stock in a way to minimize waste (e.g., FIFO—the first one in is the first one out).

12A.6.1.4: Discuss the use of sustainable food containers.

12A.6.1.5: Identify and locate facilities for recycling and waste disposal.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

12A.10.1.1: Discuss the evolution and technological progression of, and the emerging trends in stocks, soups, and sauces.

12A.10.1.2: Identify the technological progression of and the emerging trends in the culinary arts.

12A.10.1.3: Demonstrate an understanding of local food, slow food, genetically modified food, organic food, and other agricultural practices.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 10.1: Demonstrate an understanding of the evolution and technical progression of, and the emerging trends in the culinary arts.

8796: Breakfast and Dairy (12B) 40S/40E/40M

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

12B.1.3.4: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

12B.10.1.1: Discuss the evolution and technological progression of, and the emerging trends in breakfast and dairy.



General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 10.1: Demonstrate an understanding of the evolution and technical progression of, and the emerging trends in the culinary arts.

GLO 10.1: Demonstrate an understanding of the evolution and technical progression of, and the emerging trends in the culinary arts.

8797: *Menu Planning and Food costing (12C) 40S/40E/40M*

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

12C.1.3.4: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 6: Demonstrate awareness of sustainability as it pertains to the culinary arts.

12C.6.1.2: Discuss sustainable portion sizes.

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

12C.10.1.1: Discuss the evolution and technological progression of, and the emerging trends in menu planning.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 6.1: Describe the culinary arts industry's sustainability practices and impact on the environment.

GLO 10.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

8798: *Meats, Poultry, Fish, and Seafood (12D) 40S/40E/40M*

Source: *Grades 9 to 12 Culinary Arts: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/culinary_arts/index.html.



Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate sanitation, health, and safety practices as they relate to the culinary arts.

12D.1.3.4: Describe the principles of the Workplace Hazardous Materials Information System (WHMIS) and identify the safety requirements as they apply to the culinary arts. (A3.9) (TSA 13)

Goal 10: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

12D.10.1.1: Discuss the evolution and technological progression of, and the emerging trends in meats, poultry, fish, and seafood.

General Learning Outcomes (GLO)

GLO 1.3: Create and maintain a safe and sanitary work environment.

GLO 10.1: Demonstrate an understanding of the evolution and technological progression of, and the emerging trends in the culinary arts.

Senior Years Technology Education Program

Carpentry

Carpentry—Grade 9

Grade 9: Introduction to Carpentry

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to products.

9.S.1.1.2 Create a basic materials list.

Goal 6: Consider sustainability as it pertains to carpentry.

9.F.6.2.1: Demonstrate a basic knowledge of efficient material usage to reduce waste and its impact on the environment.

9.S.6.2.1: Create a cutting plan that maximizes material usage.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

9.F.7.1.1: Demonstrate a basic knowledge of developing trends in construction.



9.F.7.2.1: Demonstrate a basic knowledge of the evolving technology of tools, materials, and processes in construction.

Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

9.P.8.2.1: Identify WHMIS symbols and terminology, and follow WHMIS guidelines.

9.P.8.2.2: Comply with health and safety legislation and practices for the construction industry.

General Learning Outcomes (GLO)

GLO 1.1: Interpret blueprints, plans, and sketches.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO: 7.2: Identify examples of emerging technologies in construction.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.

Carpentry—Grade 10

Grade 10: Carpentry Fundamentals

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to products.

10.S.1.2.1: Create a basic materials list.

Goal 6: Consider sustainability as it pertains to carpentry.

10.F.6.2.1: Demonstrate a basic knowledge of efficient material usage to reduce waste and its impact on the environment.

10.S.6.2.1: Create a cutting plan that maximizes material usage.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

10.F.7.1.1: Demonstrate a basic knowledge of developing trends in construction.

10.F.7.2.1: Demonstrate a basic knowledge of the evolving technology of tools, materials, and processes in construction.

Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

10.P.8.2.1: Identify WHMIS symbols and terminology, and follow WHMIS guidelines.

10.P.8.2.2: Comply with health and safety legislation and practices for the construction industry.

10.8.3.13: Explain the Workplace Hazardous Material Information System (WHMIS). (TSA 13)



General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.

GLO 8.3: Demonstrate knowledge of the Trade Safety Awareness Manual.

Carpentry—Grade 11

Grade11A: Foundations and Floor Framing

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to products.

11A.S.1.2.2: Create a basic materials list for foundation and framing.

Goal 6: Consider sustainability as it pertains to carpentry.

11A.F.6.1.1: Identify environmental practices for surplus concrete disposal and recycling.

11A.F.6.1.2: Identify the benefits of engineered lumber products in relation to sustainability.

11A.F.6.1.5: Identify environmental practices for the recycling of lumber offcuts.

11A.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

11A.F.7.1.1: Identify developing trends in foundation systems and floor framing (e.g., ICFs).

11A.F.7.2.1: Identify the evolving technology of tools, materials, and processes in foundation systems and floor framing.

Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

11A.P.8.2.1: Use, handle, and store materials in accordance with WHMIS guidelines.

11A.P.8.2.2: Identify and comply with the laws, regulations, standards, regulatory agencies, and industry associations related to health and safety in the construction industry.

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.



GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.

Grade 11B: Wall and Basic Roof Framing

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to products.

11B.S.1.2.2: Create a basic materials list for walls and gable roofs.

Goal 6: Consider sustainability as it pertains to carpentry.

11B.F.6.1.1: Describe the benefits of engineered lumber products in relation to sustainability.

11B.F.6.1.2: Describe environmental practices for the recycling of lumber offcuts.

11B.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

11B.F.7.1.1: Identify developing trends in wall and gable roof framing (e.g., structural insulated panels).

11B.F.7.1.2: Identify a pre-engineered gable truss.

11B.F.7.2.1: Identify the evolving technology of tools, materials, and processes in wall and gable roof framing.

Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

11B.P.8.2.2: Identify and comply with the laws, regulations, standards, regulatory agencies, and industry associations related to health and safety in the construction industry.

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.



Grade 11C: Millwork

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to products.
11C.F.1.2.2: Identify practices to maximize yield from materials.
Goal 6: Consider sustainability as it pertains to carpentry.
11C.F.6.1.1: Identify considerations in material selection in relation to sustainable development.
11C.F.6.1.2: Identify environmental practices for the recycling of lumber offcuts.
11C.F.6.2.1: Identify recycling processes for materials related to millwork.
11C.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.
Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.
11C.F.7.1.1: Identify developing trends in the millwork industry.
11C.F.7.2.1: Identify the evolving technology of tools, materials, and processes in the millwork industry.
Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.
11C.P.8.2.2: Identify and comply with the laws, regulations, standards, regulatory agencies, and industry associations related to health and safety in the construction industry.

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.

Carpentry—Grade 12

Grade 12A: Advanced Framing

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.



Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to product.
12A.S.1.2.2: Create a basic materials list for floors, walls, and gable roofs.
Goal 6: Consider sustainability as it pertains to carpentry.
12A.F.6.1.1: Describe the benefits of engineered lumber products in relation to sustainability.
12A.S.6.1.1: Follow environmental practices for the recycling of lumber offcuts.
12A.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.
Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.
12A.F.7.1.1: Identify developing trends in floor, wall, and gable roof framing (e.g., structural insulated panels).
12A.F.7.2.1: Identify evolving technology of tools, materials, and processes in floor, wall, and gable roof framing.
Goal 8: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.
12A.P.8.1.1: Describe and demonstrate adherence to safe work practices when using construction materials, processes, tools, and equipment.
12A.P.8.2.1: Describe the WHMIS guidelines, and use, handle, and store materials accordingly.
12A.P.8.2.2: Describe and comply with health and safety legislation and practices for the construction industry (e.g., Workplace Safety and Health Act).

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

GLO 8.1: Describe and apply safety procedures and knowledge of health and safety rights and responsibilities.

GLO 8.2: Describe and follow health and safety laws and regulations as they relate to carpentry.

Grade 12B: Exterior Finishing

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.



Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to product.

12B.S.1.2.3: Create a basic materials list for exterior finishing.

Goal 6: Consider sustainability as it pertains to carpentry.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

12B.F.6.1.1: Appreciate the need for recycling and reclaiming exterior finish products.

12B.F.6.1.2: Describe environmental practices for the recycling of exterior finish offcuts.

12B.F.6.1.4: Identify sustainable green building and development practices and certifications (e.g., LEED).

12B.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

12B.F.7.1.1: Identify developing trends in exterior finishes (e.g., acrylic stucco, cement-based products, cultured stone).

12B.F.7.2.1: Identify the evolving technology of tools and processes in exterior finishes.

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

Grade 12C: Interior Finishing

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to product.

12C.S.1.2.3: Create a basic materials list for interior finishing.

Goal 6: Consider sustainability as it pertains to carpentry.

12C.F.6.1.1: Appreciate the need for recycling and reclaiming interior finish products.

12C.F.6.1.3: Identify sustainable green building and development practices and certifications (e.g., LEED).

12C.S.6.2.1: Apply efficient material usage practices to reduce waste and its impact on the environment.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

12C.F.7.1.1: Identify developing trends in interior finishes (e.g., pre-finished products, epoxy paints).

12C.F.7.2.1: Identify the evolving technology of tools and processes in interior finishes.

General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

Grade 12D: Advanced Millwork

Source: *Grades 9 to 12 Carpentry: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2013. www.edu.gov.mb.ca/k12/cur/teched/sytep/carpentry/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Describe the building process from plans to product.

12D.S.1.2.2: Estimate materials requirements based on a cutting list and considering maximum yield, aesthetics, and cost.

Goal 6: Consider sustainability as it pertains to carpentry.

12D.F.6.1.1: Describe the impact the manufacturing of construction materials has on the environment, cost, and limited resources.

12D.F.6.1.2: Identify considerations in material selection related to sustainable development.

12D.F.6.1.3: Identify environmental practices for the recycling of lumber offcuts.

12D.F.6.2.1: Describe how the manufacturing process (e.g., CNC) has an impact on raw material usage.

12D.F.6.2.2: Describe processes used to recycle materials related to millwork.

Goal 7: Explain the evolution of carpentry, including its technological progression and emerging trends.

12D.F.7.1.1: Describe developing trends in the millwork industry.

12D.F.7.2.1: Describe evolving technology of tools, materials, and processes in the millwork industry.



General Learning Outcomes (GLO)

GLO 1.2: Determine material requirements.

GLO 6.1: Describe the sustainability practices of construction industries (e.g., forestry, concrete) and their impact on the environment.

GLO 6.2: Describe and apply efficient material usage practices.

GLO 7.1: Explain developing trends in construction.

GLO 7.2: Identify examples of emerging technologies in construction.

Senior Years Technology Education Program

Design Drafting

(Introductory Courses plus Architectural and Engineering Streams)

Note: The learning outcomes for Grade 9, Grade 10, and Grade 11A courses are the same for the architecture and engineering streams. The courses for Grade 11B, Grade 12B, and Grade 12C are for the architecture stream. The courses for Grade 11C, Grade 12A, and Grade 12D are for the engineering stream.

Design Drafting—Grade 9

8434: Introduction to Design (9) 15S/15E 15M, 10S/10E/10M
(Architectural Stream, Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.

9.F.1.2.2: Demonstrate an awareness of sustainability as it relates to design (e.g., materials used, social impact).

9.S.1.2.2: Include sustainable concepts in design.

9.S.1.3.1: Select design solutions based on provided criteria and related research.

Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.

9.F.7.1.1: Define sustainability as it relates to the environment.

9.F.7.2.1: Define sustainability as it relates to human health and well-being.

9.F.7.3.1: Define sustainability as it relates to the economy.

Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.

9.F.8.1.2: Demonstrate an appreciation of the impact of developing trends and emerging technologies on design drafting.

Goal 9: Follow the ethical and legal standards in design drafting.

9.P.9.1.2: Follow ISO and ANSI standards to produce drawings.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

Design Drafting Grade 10

8435: Design Drafting Essentials 1 (10) 20S/20E/20M

(Architectural Stream, Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.

10.F.2.4: Discuss sustainability as it relates to design (e.g., materials used, social impact).

10.S.1.2.4: Include sustainable concepts in design.

10.S.1.3.1: Select design solutions based on provided criteria and related research.

Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.

10.F.7.1.1: Define sustainability as it relates to the environment.

10.F.7.1.2: Identify environmental sustainability factors that influence architectural and engineering design solutions.

10.F.7.2.1: Define sustainability as it relates to human health and well-being.

10.F.7.2.2: Identify sustainability factors that influence human health and well-being in architectural and engineering design solutions.

10.F.7.3.1: Define sustainability as it relates to the economy.

10.F.7.3.2: Identify economic sustainability factors that influence architectural and engineering design solutions.

Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.

10.F.8.1.2: Demonstrate an appreciation of the impact of developing trends and emerging technologies on design drafting.

Goal 9: Follow the ethical and legal standards in design drafting.

10.P.9.1.2: Identify CAN/CSA, ISO, and ANSI standards for technical drawings.

Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

10.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines.

10.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

Design Drafting—Grade 11

(Architectural Stream and Engineering Stream)

8436: Design Drafting Essentials 2 (11A) 30S/30E/30M)

(Architectural Stream, Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.
11A.F.1.2.4: Discuss sustainability as it relates to architectural/engineering design (e.g., materials, processes).
11A.S.1.2.4: Include sustainable concepts in architectural/engineering design.
11A.S.1.3.1: Select design solutions based on provided architectural/engineering criteria and related research.
Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.
11A.F.7.1.1: Appreciate the impact of sustainable practices on the environment.
11A.F.7.1.2: Identify environmental sustainability factors that influence architectural and engineering design solutions.
11A.S.7.1.1: Incorporate environmental sustainability factors in architectural and engineering design solutions.
11A.F.7.2.1: Appreciate the impact of sustainable practices on human health and well-being.
11A.F.7.2.2: Identify sustainability factors that influence human health and well-being in architectural and engineering design solutions.
11A.S.7.2.1: Incorporate human health and well-being sustainability factors in architectural and engineering design solutions.
11A.F.7.3.1: Appreciate the impact of sustainable practices on the economy.
11A.F.7.3.2: Identify economic sustainability factors that influence architectural and engineering design solutions.
11A.S.7.3.1: Incorporate economic sustainability factors in architectural and engineering design solutions.
Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.
11A.F.8.1.2: Describe the emerging trends (e.g., societal changes, styles) in architectural design.
Goal 9: Follow the ethical and legal standards in design drafting.
11A.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.
Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.
11A.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.
11A.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.



GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

8437: Architectural Design Drafting (11B) 30S/30E/30M
(Architectural Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.
11B.F.1.2.3: Consider building processes, materials, costs, and the building code's influence on design.
11B.F.1.2.4: Compare various sustainable architectural construction materials and processes (e.g., energy and resource consumption).
11B.S.1.2.2: Incorporate architectural aesthetic principles, sustainable concepts, and universal design principles into design solutions.
Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.
11B.F.7.1.2: Appreciate the environmental factors that have an impact on the building design.
11B.F.7.1.3: Identify sustainable construction certifications (e.g., R-2000).
11B.S.7.1.1: Incorporate environmental sustainability factors in architectural design solutions.
11B.S.7.2.1: Incorporate human health and well-being sustainability factors in architectural design solutions.
11B.F.7.3.1: Identify the economic sustainability factors that influence architectural design solutions (e.g., local versus imported products, cradle to cradle, recycled materials).
11B.F.7.3.2: Appreciate the economic impact of sustainability factors on architectural design solutions.
11B.S.7.3.1: Incorporate economic sustainability factors in architectural design solutions.
Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.
11B.F.8.1.2: Describe emerging styles and trends (e.g., building use, life of building, evolution of building, flexible housing, and home office) and their impact on architectural design.
Goal 9: Follow the ethical and legal standards in design drafting.
11A.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.



Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

11B.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.

11B.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

8438: Engineering Design Drafting (11C) 30S/30E/30M (Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.

11C.F.1.2.3: Examine sustainable engineering principles (e.g., energy, service life, recycling, resource consumption, social impact) to solve engineering problems.

11C.S.1.2.4: Incorporate engineering aesthetic, sustainable, and universal design principles into design solutions.

11C.S.1.3.1: Select design solutions based on engineering research (e.g., manufacturing processes, material properties, availability, cost, standard components).

Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.

11C.F.7.1.1: Identify environmental sustainability factors that influence engineering design solutions (e.g., reusability and recyclability of materials, energy efficiency of manufacturing processes).

11C.F.7.1.2: Appreciate the environmental factors that have an impact on product design and manufacturing.

11C.S.7.1.1: Incorporate environmental sustainability factors in engineering design solutions.

11C.F.7.2.2: Appreciate the human health and well-being sustainability factors that have an impact on manufacturing processes.

11C.S.7.2.1: Incorporate human health and well-being sustainability factors in engineering design solutions.

11C.F.7.3.1: Identify the economic sustainability factors that influence engineering design solutions (e.g., local versus imported products, cradle to cradle, serviceable, and recycled materials).

11C.F.7.3.2: Appreciate the economic impact of sustainability factors on engineering design solutions.

11C.S.7.3.1: Incorporate economic sustainability factors in engineering design solutions.

Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.

11C.F.8.1.2: Describe emerging styles and trends (e.g., cradle to cradle, virtual design and testing, development of new materials, questioning existing design, creative thinking) and their impact on engineering design.

Goal 9: Follow the ethical and legal standards in design drafting.

11C.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.

Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

11C.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.

11C.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

Design Drafting—Grade 12
(Architectural Stream and Engineering Stream)

8439: Advanced Engineering Design Drafting (12A) 40S/40E/40M
(Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.

12A.F.1.2.2: Compare the factors (e.g., manufacturing processes, material properties, availability, cost, standard components) that influence design.

12A.F.1.2.3: Compare sustainable engineering principles (e.g. energy, service life, recycling, resource consumption, social impact) to solve engineering problems.

12A.S.1.2.4: Select and incorporate engineering aesthetic, sustainable, and universal design principles into design solutions.

12A.F.1.3.1: Identify the decision-making process required to arrive at the best (compromised) design solution (e.g., cost, materials, manufacturing process, recyclability, performance, ease of manufacture and repair).

12A.S.1.3.1: Select design solutions based on engineering and manufacturing research.

Goal 3: Use appropriate materials and processes of building/manufacturing.

12A.F.3.2.2: Identify project management considerations (e.g., timelines, material supplies, project management software, waste) for design solutions.

Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.

12A.F.7.1.1: Identify sustainable materials and manufacturing processes that affect engineering design solutions (e.g., electrical conservation, lean manufacturing, conservation of resources, cradle to cradle, alternative energy).

12A.F.7.1.2: Differentiate between traditional and sustainable manufacturing processes and their impacts on the environment.

12A.S.7.1.1: Incorporate sustainable materials and manufacturing processes in engineering design solutions.

12A.F.7.2.1: Identify human health and well-being sustainable materials and manufacturing processes that affect engineering design solutions (e.g., ergonomics, coatings, sharp edges, health and safety manufacturing, servicing, user and recycling implications).

12A.F.7.2.2: Differentiate among natural and synthetic materials, and sustainable manufacturing processes and their impact on human health and well-being.

12A.S.7.2.1: Incorporate human health and well-being, sustainable materials, and manufacturing processes in engineering design solutions.

12A.F.7.3.1: Identify economic sustainable materials and manufacturing processes that affect engineering design solutions (e.g., solar, geothermal, wind, hydroelectric, renewable materials, rigorous prototyping).

12A.F.7.3.2: Differentiate between traditional and sustainable manufacturing processes and their economic impacts.

12A.S.7.3.1: Incorporate economic sustainable materials and manufacturing processes in engineering design solutions.

Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.

12A.F.8.1.2: Describe emerging styles and trends and their impact on the selection of materials and manufacturing processes (e.g., nanotechnology, manufacturing in space, local manufacturing/cottage industries, serviceability, new trends in manufacturing).

Goal 9: Follow the ethical and legal standards in design drafting.

12A.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.

Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

12A.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.

12A.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 3.2: Describe building/manufacturing processes used in design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

8648: *Advanced Architectural Design Drafting (12B)* 40S/40E/40M (Architectural Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.
12B.F.1.2.2: Consider building processes, material types and availability, costs, and the building code's influence on design.
12B.S.1.2.3: Incorporate architectural aesthetic principles, sustainable concepts, and universal design principles into design solutions.
12B.F.1.3.1: Identify influences (e.g., cost, materials, sustainability) that can impact the decision-making process for architectural design solutions.
Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.
12B.F.7.1.1: Identify sustainable materials and building systems that affect architectural design solutions (e.g., electrical conservation, green construction, water conservation, cradle to cradle, alternative energy).
12B.F.7.1.2: Differentiate between traditional and sustainable building systems and their impacts on the environment.
12B.S.7.1.1: Incorporate sustainable materials and building systems in architectural design solutions.
12B.S.7.2.1: Incorporate human health and well-being, sustainable materials, and building systems in architectural design solutions.
12B.F.7.3.2: Differentiate between traditional and sustainable building systems and their economic impacts.
12B.S.7.3.1: Incorporate economic sustainable materials and building systems in architectural design solutions.
Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.
12B.F.8.1.2: Describe emerging styles and trends and their impact on the selection of materials and building systems.
Goal 9: Follow the ethical and legal standards in design drafting.
12B.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.
Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.
12B.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.
12B.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.



GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

8649: Applied Architectural Design Drafting (12C) 40S/40E/40M
(Architectural Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.
12C.F.1.2.2: Assess the factors (e.g., sustainability, universal design, client requirements, aesthetics) that influence design.
12C.S.1.2.1: Develop a bubble diagram and sketches based on the design factors (e.g., sustainability, universal design, client requirements, and aesthetics).
12C.F.1.3.1: Identify influences (e.g., client requirements, cost, materials, building codes) that can impact the decision-making process for architectural design solutions.
Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.
12C.F.7.1.1: Analyze sustainable factors, materials, and building systems that affect architectural design solutions.
12C.F.7.1.3: Identify sustainable construction certifications (e.g., LEED).
12C.S.7.2.1: Select and incorporate human health and well-being sustainability factors, materials, and building systems in architectural design solutions.
12C.F.7.3.1: Analyze economic sustainable factors that affect the selection of materials and building systems.
12C.F.7.3.2: Analyze the economic impact of sustainability factors, materials, and building systems on architectural design solutions.
12C.S.7.3.1: Select economic sustainability factors, materials, and building systems that affect architectural design solutions.
Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.
12C.F.8.1.2: Describe emerging styles and trends and their impact on the selection of materials, building systems, and architectural design.
Goal 9: Follow the ethical and legal standards in design drafting.
12C.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.



Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

12C.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.

12C.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numeric information for design solutions.

GLO 1.3: Synthesize information and ideas to create design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.

GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

8669: Applied Engineering Design Drafting (12D) 40S/40E/40M (Engineering Stream)

Source: *Grades 9 to 12 Design Drafting: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/design_drafting/index.html.

Specific Learning Outcomes (SLO)

Goal 1: Solve problems using the design process.

12D.F.1.2.1: Research and analyze the engineering principles (e.g., sustainability, universal design, aesthetic) and factors (e.g., client requirements, materials, cost manufacturing process, availability) to solve engineering design problems.

12D.S.1.2.1: Select and incorporate engineering principles (e.g., sustainability, universal design, aesthetic) and factors (e.g., client requirements, materials, manufacturing process, cost, availability) into design solutions.

12D.S.1.3.1: Select design solutions based on engineering research and client requirements.

Goal 3: Use appropriate materials and processes of building/manufacturing.

12D.F.3.2.1: Analyze manufacturing processes based on research and client requirements.

12D.F.3.2.2: Describe project management and production practices (e.g., LEAN, TQM, TPS).

12D.S.3.2.1: Select manufacturing processes based on research and client requirements.

Goal 7: Demonstrate awareness of sustainability as it pertains to design drafting.

12D.F.7.1.1: Analyze sustainable factors, materials, and manufacturing processes that affect engineering design solutions.

12D.F.7.1.2: Differentiate between the effects of various manufacturing processes on the environment.

12D.S.7.1.1: Select and incorporate sustainable factors, materials, and manufacturing processes that affect engineering design solutions.

12D.F.7.2.1: Analyze sustainable factors, materials, and manufacturing processes that affect human health and well-being.

12D.F.7.2.2: Analyze the effect of manufacturing processes on human health and well-being.

12D.S.7.2.1: Select and incorporate human health and well-being sustainable factors, materials, and manufacturing processes in engineering design solutions.

12D.F.7.3.1: Analyze economic sustainability factors that affect the selection of materials and manufacturing processes.

12D.F.7.3.2: Analyze the economic impact of sustainable factors, materials, and manufacturing processes on engineering design solutions.

12D.S.7.3.1: Select economic sustainable factors, materials, and manufacturing processes that affect engineering design solutions.

Goal 8: Understand the evolution of design drafting, including its technological progression and emerging trends.

12D.F.8.1.2: Describe emerging styles and trends and their impact on the selection of materials, manufacturing processes, and engineering design.

Goal 9: Follow the ethical and legal standards in design drafting.

12D.P.9.1.2: Produce technical drawings to CAN/CSA, ISO, and ANSI standards.

Goal 10: Demonstrate a knowledge of and ability to recognize and apply appropriate health and safety requirements and practices to maintain a safe workplace.

12D.P.10.2.2: Identify WHMIS symbols and terminology, and follow WHMIS guidelines, including the location of MSDS sheets.

12D.P.10.2.3: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 1.2: Research and analyze verbal and numerical information for design solutions.

GLO 3.2: Describe building/manufacturing processes used in design solutions.

GLO 7.1: Understand the implications of architectural/engineering design on the environment.

GLO 7.2: Describe the impact of architectural/engineering design on human health and well-being.

GLO 7.3: Recognize the economic impact of sustainable practices in architectural/engineering design.

GLO 8.1: Describe the evolution of design drafting, including its technological progression and emerging trends.



GLO 9.1: Incorporate the local and national building codes and standards as well as manufacturing and engineering standards into designs.

GLO 10.2: Describe health and safety laws and regulations.

Senior Years Technology Education Program

Hairstyling

Hairstyling—Grade 10

Grade 10A: *Introduction to Hairstyling, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Describe and demonstrate appropriate personal and public sanitation, and health and safety practices as they apply to hairstyling.

5.2.10.: Describe WHMIS, its rationale and major elements. (B3.1, B3.4)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Research current hairstyling technology and emerging trends.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Demonstrate the safe storage, recycling, disposal of products.

9.2.2.: Discuss the potential for increased sustainability in a hair salon.

General Learning Outcomes (GLO)

GLO 5.2.: Create and maintain a safe working environment.

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.



Grade 10B: Basic Hairstyling, 2012—Draft

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1. Identify new trends in the hairstyling industry. (A6.3)

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1. Demonstrate the safe storage, recycling, disposal of products.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 10C: Basic Haircutting and Thermal Styling, 2012—Draft

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1: Describe the technological progression and emerging trends in artificial hair.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Demonstrate recycling and disposal as they pertain to basic haircutting and thermal styling.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.



Grade 10D: *Related Salon Services, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Identify emerging trends in related salon services. (A6.3)

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Describe and demonstrate the safe disposal of chemicals used in related salon services.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Hairstyling—Grade 11

Grade 11A: *Intermediate Haircutting and Barbering Techniques, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Describe the technological progression and emerging trends in haircutting and barbering.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Discuss the recycling of hairstyling equipment, tools, implements, materials, products, consumable items.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.



GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 11B: *Hair Colouring, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Describe the technological progression and emerging trends in hair colouring.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Describe safety procedures when disposing of chemical products and recycling containers.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hair colouring.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 11C: *Intermediate Hairstyling and Artificial Hair, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Describe the technological progression and emerging trends in artificial hair.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Describe sustainability practices in relation to artificial hair.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.



GLO 9.2.: Describe the hairstyling industry’s sustainability practices and impact on the environment.

Grade11D: *Chemical Texture Services, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.
6.2.1.: Describe the technological progression and emerging trends, new styles, products, and tools in chemical texture services.
Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.
9.2.1.: Demonstrate the safe storage and disposal of the chemicals used in chemical texture services.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry’s sustainability practices and impact on the environment.

Hairstyling—Grade 12

Grade 12A: *Advanced Hairstyling and Colouring, 2012—Draft*

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.
6.2.1.: Describe the technological progression and emerging trends in advanced hair colouring styling.
Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.
9.2.1.: Discuss the sustainability practices and impact on the environment of hair colouring products.



General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 12B: *Advanced Haircutting and Chemical Texture Services*, 2012—Draft

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Describe the technological progression and emerging trends in advanced haircutting and chemical texture services.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

6.2.1.: Describe the technological progression and emerging trends in advanced haircutting and chemical texture services.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in advanced hairstyling and chemical texture services.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 12C: *Salon Operation*, 2012—Draft

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*, July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Describe the technological progression and emerging trends in hair salon operation.



Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Demonstrate ways to reduce, reuse, and recycle salon materials.

9.2.2.: Demonstrate an awareness of the amounts of products and resources used while performing hairstyling and related services, and how to minimize waste.

9.2.3.: Demonstrate the appropriate disposal of packaging and containers.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.

Grade 12D: Certificate Preparation

Source: *Grades 10 to 12 Hairstyling: Manitoba Curriculum Framework of Outcomes, Unedited Draft*. July 2012. www.edu.gov.mb.ca/k12/cur/teched/sytep/hairstyling/index.html.

Specific Learning Outcomes (SLO)

Goal 6: Understand the evolution, technological progression, and emerging trends in hairstyling.

6.2.1.: Discuss the importance of career-long exploration of the technological progression and emerging trends in hairstyling in order to remain current and contribute to the industry.

Goal 9: Demonstrate awareness of sustainability as it pertains to hairstylists and the hairstyling industry.

9.2.1.: Demonstrate an awareness of the hairstyling industry's sustainability practices and impact on the environment.

General Learning Outcomes (GLO)

GLO 6.2.: Demonstrate an awareness of the technological progression and emerging trends in hairstyling.

GLO 9.2.: Describe the hairstyling industry's sustainability practices and impact on the environment.



Senior Years Technology Education Program

Print Media

Print Media: Grade 9

8465: Introduction to Print Production (9) 15S/15E/15M, 10S/10E/10M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.

9.F.5.1.1: Identify the significance of recycling and reusing.

9.F.5.1.2: Identify the need for proper disposal of used chemicals and cleaning supplies.

9.S.5.1.1: Recycle paper and materials used in the print process.

9.S.5.1.2: Follow proper disposal process for used chemicals and cleaning supplies.

9.F.5.2.1: Identify the print industry's social responsibility to human health and well-being.

Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.

9.F.6.2.1: Demonstrate awareness of the impact emerging trends and technology have on the print industry.

9.F.6.3.1: Demonstrate awareness of the impact emerging trends and technology have on the print industry.

Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.

9.P.7.2.1: Identify WHMIS symbols, labels, and terminology, and follow WHMIS guidelines.

9.P.7.2.2: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.2: Describe the interaction between society and the print industry and its impact on sustainability.

GLO 6.2: Demonstrate an awareness of the evolution and progression of design styles and approaches.

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.



Print Media: Grade 10

8846: Print Production Fundamentals (10) 20S/20E/20M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.
10.F.5.1.1: Identify the significance of recycling and reusing.
10.F.5.1.2: Identify the need for proper disposal of used chemicals and cleaning supplies.
10.S.5.1.1: Recycle paper and materials used in the print process.
10.F.5.2.1: Identify the print industry's social responsibility to human health and well-being, including physical and emotional health.
10.F.5.3.1: Demonstrate awareness that the print industry can experience economic benefits by implementing sustainable practices.
10.S.5.3.1: Recognize that the print industry can experience economic benefits by implementing sustainable practices.
Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.
10.F.6.2.2: Explore how audience, new materials, and techniques are transforming design (e.g., varnishes, 3D printing, and die cutting).
Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.
10.P.7.2.1: Identify WHMIS symbols, labels, and terminology, and follow WHMIS guidelines.
10.P.7.2.2: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.2: Describe the interaction between society and the print industry and its impact on sustainability.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.2: Demonstrate an awareness of the evolution and progression of design styles and approaches.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.



Print Medi: Grade 11

8467: Design (11A) 30S/30E/30M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.
11A.F.5.1.1: Describe implications of design choices on the environment (e.g., paper, ink, coatings, aluminum plates, and de-inking chemicals).
11A.F.5.1.2: Describe paper recycling options (e.g., post-consumer and pre-consumer paper, F and SC paper).
11A.F.5.1.3: Describe methods of disposal for e-waste and the impact on the environment (e.g., computers, printers, scanners, and software).
11A.S.5.1.1: Include recognition of the sustainable practices (e.g., eco-friendly logos and information) in the design solution.
11A.F.5.3.1: Discuss the economic benefits of sustainable practices used to achieve the design solution.
Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.
11A.F.6.3.1: Demonstrate an awareness of the continuing evolution of design, as well as its emerging trends and future technologies.
Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.
11A.P.7.2.1: Describe and follow health and safety laws and regulations as they relate to design.
11A.P.7.2.2: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.

8468: Pre-Press (11B) 30S/30E/30M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.



Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.
11B.F.5.1.1: Identify the significance of reducing, reusing, and recycling as it applies to pre-press.
11B.S.5.1.1: Reduce, reuse, or recycle pre-press materials (i.e., chemicals, paper, or image carriers).
11B.F.5.2.1: Demonstrate an awareness of diverse perspectives, including community and cultural perspectives, and how these have evolved through time.
11B.F.5.3.1: Identify economic benefits of sustainable practices in the print industry (i.e., water-based inks and recycling paper, and more energy-efficient equipment).
11B.S.5.3.1: Discuss economic benefits of sustainable practices in the print industry (i.e., water-based inks and recycling paper, and more energy-efficient equipment).
Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.
11B.F.6.3.1: Demonstrate an awareness of the continuing evolution of pre-press, as well as its emerging trends and future technologies.
Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.
11B.P.7.2.1: Describe and follow health and safety laws and regulations as they relate to pre-press.
11B.P.7.2.2: Comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.2: Describe the interaction between society and the print industry and its impact on sustainability.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.

8469: Print Production (11C) 30S/30E/30M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.
11C.F.5.1.1: Identify the significance of reducing, reusing, and recycling as it applies to print production.



11C.S.5.1.1: Reduce, reuse, or recycle print production materials (i.e., chemicals, paper, or image carriers).

11C.F.5.3.1: Recognize the economic benefits of sustainability on print production.

Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.

11C.F.6.3.1: Demonstrate an awareness of the continuing evolution of print production, as well as its emerging trends and future technologies.

Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.

11C.P.7.2.1: Use, handle, and store materials in accordance with WHMIS guidelines.

11C.P.7.2.2: Identify and comply with health and safety legislation and practices.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.

Print Media: Grade 12

8470: Advanced Design (12A) 40S/40E/40M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.

12A.F.5.1.1: Consider design choices based on environmental impact (e.g., recycled paper, coatings, print providers, and water-based ink).

12A.F.5.1.2: Describe local methods of disposal for e-waste (e.g., computers, printers, scanners, and software).

12A.F.5.1.3: Discuss the global impact of e-waste.

12A.F.5.1.4: Recognize the impact of environmentally friendly materials on the design message.

12A.S.5.1.1: Advocate for sustainable practices.

12A.F.5.3.1: Evaluate the economic benefit of a sustainability-influenced design solution.

Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.

12A.F.6.3.1: Research and identify emerging trends and technology related to the design process and the need to adapt to changes.

Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.

12A.P.7.1.1: Describe and apply health and safety rights, responsibilities, and safety procedures as they apply to design.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.1: Describe and apply health and safety rights, responsibilities, and safety procedures.

8471: Advanced Pre-press (12B) 40S/40E/40M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.

12B.F.5.1.1: Evaluate processes to reuse, reduce, or recycle pre-press materials (i.e., chemicals, paper, and image carriers).

12B.S.5.1.1: Reduce, reuse, or recycle pre-press materials (i.e., chemicals, paper, or image carriers).

12B.S.5.1.2: Follow proper protocol for dealing with used chemicals and cleaning supplies.

12B.F.5.3.1: Research specific economic benefits of sustainable practices in the print industry (i.e., water-based inks and recycling paper, more energy-efficient equipment).

12B.S.5.3.1: Present specific economic benefits of sustainable practices in the print industry (i.e., water-based inks and recycling paper, more energy-efficient equipment).

Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.

12B.S.6.1.1: Describe the historical significance, social impact, and continuing evolution and development of pre-press materials and processes.

12B.S.6.3.1: Demonstrate an awareness of emerging and future pre-press technologies.

Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.

12B.P.7.1.1: Describe and apply health and safety rights, responsibilities, and safety procedures as they apply to pre-press.

12B.P.7.1.2: Describe and demonstrate adherence to safe work practices when using print production materials, processes, tools, and equipment.

12B.P.7.2.1: Describe the WHMIS guidelines and use, handle, and store materials accordingly.

12B.P.7.2.3: Describe and comply with health and safety legislation and practices (e.g., Workplace Safety and Health Act).

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.

GLO 5.3: Recognize the economic benefits of sustainable practices in the print industry.

GLO 6.1: Appreciate the historical significance, social impact, and continuing evolution and development of the print industry (e.g., the evolution and progression of design styles and approaches).

GLO 6.3: Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.

GLO 7.1: Describe and apply health and safety rights, responsibilities, and safety procedures.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.

8472: Advanced Print Production (12C) 40S/40E/40M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.

12C.S.5.1.1: Follow sustainability practices for processes and materials used in print production.

12C.S.5.3.1: Present specific economic benefits of sustainable practices in print production.

Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.

12C.S.6.1.1: Describe the historical significance, social impact, and continuing evolution and development of print production materials and processes.

12C.S.6.3.1: Demonstrate an awareness of emerging and future print production technologies.

Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.

12C.P.7.1.1: Describe and apply health and safety rights, responsibilities, and safety procedures as they apply to print production.

12C.P.7.2.1: Demonstrate appropriate health and safety regulations that are required during print production.

General Learning Outcomes (GLO)

GLO 5.1: Appreciate the implications of the printing process on the environment.



- GLO 5.3:** Recognize the economic benefits of sustainable practices in the print industry.
- GLO 6.1:** Appreciate the historical significance, social impact, and continuing evolution and development of the print industry (e.g., the evolution and progression of design styles and approaches).
- GLO 6.3:** Demonstrate awareness of the continuing evolution of the print industry, as well as its emerging trends and future technologies.
- GLO 7.1:** Describe and apply health and safety rights, responsibilities, and safety procedures.
- GLO 7.2:** Describe and follow health and safety laws and regulations as they relate to graphic print production.

8473: Advanced Print Media (12D) 40S/40E/40M

Source: *Grades 9 to 12 Print Media: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/print_media/index.html.

Specific Learning Outcomes (SLO)

Goal 5: Consider the impact of sustainability as it pertains to the print industry.
12D.S.5.1.1: Initiate appropriate sustainability practices for all processes and materials used in the print job.
12D.S.5.3.1: Initiate the discussion of specific economic benefits of sustainable practices in the print job.
Goal 6: Explain the evolution, technological progression, and emerging trends in the print industry.
12D.S.6.1.1: Demonstrate the influence of the historical significance, social impact, or continuing evolution of the print industry within a print job.
Goal 7: Demonstrate knowledge of appropriate health and safety practices and the ability to recognize and apply them to maintain a safe workplace.
12D.P.7.1.1: Initiate health and safety procedures that are required during the span of a print job.
12D.P.7.2.1: Initiate the practice of appropriate health and safety laws and regulations that are required during a print job.

General Learning Outcomes (GLO)

- GLO 5.1:** Appreciate the implications of the printing process on the environment.
- GLO 5.3:** Recognize the economic benefits of sustainable practices in the print industry.
- GLO 5.1:** Appreciate the implications of the printing process on the environment.
- GLO 5.3:** Recognize the economic benefits of sustainable practices in the print industry.
- GLO 6.1:** Appreciate the historical significance, social impact, and continuing evolution and development of the print industry (e.g., the evolution and progression of design styles and approaches).



GLO 7.1: Describe and apply health and safety rights, responsibilities, and safety procedures.

GLO 7.2: Describe and follow health and safety laws and regulations as they relate to graphic print production.

Senior Years Technology Education Programs

Sustainable Energy

Sustainable Energy—Grade 9

8232: *Exploration of Sustainable Energy (9)* 15S / 15E / 15M 10S / 10E / 10M

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

9.1.1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

9.1.1.2: Identify health and safety requirements.

9.1.1.7: Identify hazard recognition and control practices.

9.1.1.9: Identify safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

9.1.1.11: Identify safe work practices related to the sustainable energy industry.

9.1.1.13: Identify safe material-handling procedures.

9.1.1.14: Read, interpret, and communicate safety information (e.g., material safety data sheets [MSDS]) related to sustainable energy.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.



Sustainable Energy—Grade 10

8233: *Introduction to Sustainable Energy (10)* 20S / 20E / 20M

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.
10.1.1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.
10.1.1.2: Identify health and safety requirements.
10.1.1.7: Identify hazard recognition and control practices.
10.1.1.9: Identify safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).
10.1.1.11: Identify safe work practices related to the sustainable energy industry.
10.1.1.13: Identify safe material-handling procedures.
10.1.1.14: Read, interpret, and communicate safety information (e.g., material safety data sheets [MSDS]) related to sustainable energy.
Goal 3: Demonstrate the knowledge and skills required to promote and plan sustainable energy systems.
10.3.1.2: Describe sustainable energy sources and how they differ from conventional energy sources.
10.3.2.1: Evaluate various sustainable energy options (e.g., using RETScreen software).
Goal 6: Describe and apply transferable cross-curricular knowledge and skills as they relate to sustainable energy.
10.6.1.2: Explore problems and issues that demonstrate interdependence among science, technology, society, and the environment.
Goal 9: Demonstrate awareness of sustainability as it pertains to the sustainable energy industry.
10.9.1.1: Discuss the impact of sustainable energy systems on human health and well-being.
10.9.2.1: Describe how the use of sustainable energy can be sustainable from an environmental perspective.
10.9.3.1: Describe how the use of sustainable energy can be sustainable from an economic perspective.
Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.
10.11.1.3: Demonstrate an understanding of the technological progression of and emerging trends in sustainable energy within Manitoba.
10.11.1.4: Demonstrate an understanding of the history of human energy use and related changes to the environment.



General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 3.1: Demonstrate the knowledge and skills required to promote sustainable energy systems.

GLO 3.2: Demonstrate the knowledge and skills required to plan sustainable energy systems.

GLO 6.1: Demonstrate information and communication technology skills required in the sustainable energy industry.

GLO 9.1: Describe the impact of sustainability on the health and well-being of sustainable energy industry workers, their customers, and those who are affected by their products and services.

GLO 9.2: Describe the sustainable energy industry's sustainability practices and their impact on the environment.

GLO 9.3: Describe the relationship between the economy and sustainability practices within the sustainable energy industry.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

Sustainable Energy—Grade 11

8234: *Sustainable Energy: Electrical Systems (11A) 30S / 30E / 30M*

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

11A.1.1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

11A.1.1.2: Identify health and safety requirements.

11A.1.1.7: Identify hazard recognition and control practices.

11A.1.1.9: Identify safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

11A.1.1.11: Identify safe work practices related to the sustainable energy industry.

11A.1.1.13: Identify safe material-handling procedures.

11A.1.1.14: Read, interpret, and communicate safety information (e.g., material safety data sheets [MSDS]) related to sustainable energy.

Goal 9: Demonstrate awareness of sustainability as it pertains to the sustainable energy industry.

11A.9.1.1: Discuss the impact of sustainable electrical systems on human health and well-being.

11A.9.2.1: Compare and contrast the environmental impact of hydroelectric dams and sustainable electrical energy sources.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

11A.11.1.3: Demonstrate an understanding of the latest industry trends.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 9.1: Describe the impact of sustainability on the health and well-being of sustainable energy industry workers, their customers, and those who are affected by their products and services.

GLO 9.2: Describe the sustainable energy industry's sustainability practices and their impact on the environment.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

8245: *Sustainable Energy: Heating/Cooling Systems (11B) 30S / 30E / 30M*

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

11B.1.1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

11B.1.1.2: Identify health and safety requirements.

11B.1.1.7: Identify hazard recognition and control practices.

11B.1.1.9: Identify safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

11B.1.1.11: Identify safe work practices related to the sustainable energy industry.

11B.1.1.13: Identify safe material-handling procedures.

11B.1.1.14: Read, interpret, and communicate safety information (e.g., material safety data sheets [MSDS]) related to sustainable energy.



Goal 2: Demonstrate the safe and appropriate operation, handling, cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

11B.2.2.3: Demonstrate the safe and appropriate storage of feedstock for use as biomass heating fuel.

Goal 9: Demonstrate awareness of sustainability as it pertains to the sustainable energy industry.

11B.9.1.1: Discuss the impact of sustainable heating/cooling systems on human health and well-being.

11B.9.1.2: Describe the relationship between the proper design and installation and the long-term sustainability of sustainable energy technologies.

11B.9.3.2: Describe how biomass heating systems can add value to agricultural crops.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

11B.11.1.3: Demonstrate an understanding of the latest industry trends.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 2.2: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

GLO 9.1: Describe the impact of sustainability on the health and well-being of sustainable energy industry workers, their customers, and those who are affected by their products and services.

GLO 9.3: Describe the relationship between the economy and sustainability practices within the sustainable energy industry.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

8246: *Sustainable Energy: Transportation Systems (11C) 30S / 30E / 30M*

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

11C.1.1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

11C.1.1.2: Identify health and safety requirements.

11C.1.1.7: Identify hazard recognition and control practices.



11C.1.1.9: Identify safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

11C.1.1.11: Identify safe work practices related to the sustainable energy industry.

11C.1.1.13: Identify safe material-handling procedures.

11C.1.1.14: Read, interpret, and communicate safety information (e.g., material safety data sheets [MSDS]) related to sustainable energy.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

11C.11.1.3: Demonstrate an understanding of the latest industry trends.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

Sustainable Energy—Grade 12

8279: *Sustainable Energy: Advanced Solar (12A) 40S / 40E / 40M*

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes—2014* www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

12A.1.1.1: Demonstrate adherence to safety practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

12A.1.1.2: Describe health and safety requirements.

12A.1.1.7: Describe hazard recognition and control practices.

12A.1.1.9: Describe safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

Goal 2: Demonstrate the safe and appropriate operation, handling, cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

12A.2.1.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in solar energy systems.

12A.2.2.1: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in solar energy systems.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

12A.11.1.1: Demonstrate an understanding of the evolution of solar energy systems, including their technological progression and emerging trends.



General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 2.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items.

GLO 2.2: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

8292: Sustainable Energy: Advanced Wind (12B) 40S / 40E / 40M

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

12B.1.1.1: Demonstrate adherence to safety practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

12B.1.1.2: Describe health and safety requirements.

12B.1.1.7: Describe hazard recognition and control practices.

12B.1.1.9: Describe safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

Goal 2: Demonstrate the safe and appropriate operation, handling, cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

12B.2.1.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in wind energy systems.

12B.2.2.1: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in wind energy systems.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

12B.11.1.1: Demonstrate an understanding of the evolution of wind energy systems, including their technological progression and emerging trends.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 2.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items.



GLO 2.2: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

8293: Sustainable Energy: Biomass Systems (12C) 40S / 40E / 40M

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.

12C.1.1.1: Demonstrate adherence to safety practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

12C.1.1.2: Describe health and safety requirements.

12C.1.1.7: Describe hazard recognition and control practices.

12C.1.1.9: Describe safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).

Goal 2: Demonstrate the safe and appropriate operation, handling, cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

12C.2.1.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in biomass energy systems.

12C.2.2.1: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in biomass energy systems.

Goal 3: Demonstrate the knowledge and skills required to promote and plan sustainable energy systems.

12C.3.1.1: Describe existing strategies, both in the private and public sectors (e.g., Manitoba Innovation, Energy and Mines, Manitoba Hydro, Manitoba: 50 by '30, Manitoba Sustainable Energy Association, Energy Manitoba), that promote biomass energy systems in Manitoba.

12C.3.2.4: Determine the current local availability of biomass feedstock, and predict future feedstock availability.

12C.3.2.7: Plan a small-scale set-up to produce biodiesel.

12C.3.2.8: Discuss logistics (e.g., removal, storage) related to ash content in feedstock.

Goal 4: Demonstrate the knowledge and skills required to install or convert sustainable energy systems.

12C.4.1.2: Produce a test batch of biodiesel, and run a small diesel engine with the biodiesel.

Goal 6: Describe and apply transferable cross-curricular knowledge and skills as they relate to sustainable energy.

12C.6.1.1: Demonstrate how geographic information systems (GIS) can be used to inform decisions on fuel selection for biomass energy systems.

12C.6.2.1: Read, interpret, and communicate information related to biomass energy systems.

Goal 9: Demonstrate awareness of sustainability as it pertains to the sustainable energy industry.

12C.9.1.1: Discuss the benefits of biomass energy systems to human health and well-being.

12C.9.1.2: Discuss how biomass energy systems can negatively affect humans (e.g., emissions).

12C.9.2.1: Describe sustainability practices related to biomass energy systems and their impact on the environment.

12C.9.3.1: Discuss the effect of biomass energy systems on the local and national economies.

Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.

12C.11.1.1: Demonstrate an understanding of the evolution of biomass energy systems, including their technological progression and emerging trends.

General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 2.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items.

GLO 2.2: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

GLO 3.1: Demonstrate the knowledge and skills required to promote sustainable energy systems.

GLO 3.2: Demonstrate the knowledge and skills required to plan sustainable energy systems.

GLO 4.1: Demonstrate the knowledge and skills required to perform the installation or conversion of sustainable energy systems.

GLO 6.1: Demonstrate information and communication technology skills required in the sustainable energy industry.

GLO 6.2: Read, interpret, and communicate information related to the sustainable energy industry.

GLO 9.1: Describe the impact of sustainability on the health and well-being of sustainable energy industry workers, their customers, and those who are affected by their products and services.

GLO 9.2: Describe the sustainable energy industry's sustainability practices and their impact on the environment.

GLO 9.3: Describe the relationship between the economy and sustainability practices within the sustainable energy industry.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.



8294: Sustainable Energy: Applied Systems (12D) 40S / 40E / 40M

Source: *Grades 9 to 12 Sustainable Energy: Manitoba Technical-Vocational Curriculum Framework of Outcomes*, 2014. www.edu.gov.mb.ca/k12/cur/teched/sytep/sust_energy/full_doc.pdf.

Specific Learning Outcomes (SLO)

<p>Goal 1: Describe and apply appropriate health and safety practices as they apply to the sustainable energy industry.</p>
<p>12D.1.1.1: Demonstrate adherence to safety practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.</p>
<p>12D.1.1.2: Describe health and safety requirements.</p>
<p>12AD1.1.7: Describe hazard recognition and control practices.</p>
<p>12D.1.1.9: Describe safety requirements as they apply to the Workplace Hazardous Materials Information System (WHMIS).</p>
<p>Goal 2: Demonstrate the safe and appropriate operation, handling, cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.</p>
<p>12D.2.1.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items used in applied sustainable energy systems.</p>
<p>12D.2.2.1: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items used in applied sustainable energy systems.</p>
<p>Goal 6: Describe and apply transferable cross-curricular knowledge and skills as they relate to sustainable energy.</p>
<p>12D.6.1.1: Use geographic information systems (GIS) to perform an environmental feasibility study for a sustainable energy system.</p>
<p>12D.6.2.1: Read, interpret, and communicate information related to sustainable energy systems.</p>
<p>Goal 9: Demonstrate awareness of sustainability as it pertains to the sustainable energy industry.</p>
<p>12D.9.1.1: Research the benefits of sustainable energy systems to human health and well-being, and incorporate the findings into a feasibility study.</p>
<p>12D.9.1.2: Research the long-term health hazards related to sustainable energy systems, and incorporate the findings into a feasibility study.</p>
<p>12D.9.2.1: Research the environmental impact of sustainable energy systems, and incorporate the findings into a feasibility study.</p>
<p>12D.9.3.1: Research the effect of sustainable energy systems on the local and national economies, and incorporate the findings into a feasibility study.</p>
<p>Goal 11: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.</p>
<p>12D.11.1.1: Research the evolution of sustainable energy systems, including their technological progression and emerging trends.</p>



General Learning Outcomes (GLO)

GLO 1.1: Demonstrate adherence to safe practices and procedures for facilities, processes, tools, and equipment used in the sustainable energy industry.

GLO 2.1: Demonstrate the safe and appropriate operation and handling of equipment, tools, materials, products, and consumable items.

GLO 2.2: Demonstrate the safe and appropriate cleaning, maintenance, and storage of equipment, tools, materials, products, and consumable items.

GLO 6.1: Demonstrate information and communication technology skills required in the sustainable energy industry.

GLO 6.2: Read, interpret, and communicate information related to the sustainable energy industry.

GLO 9.1: Describe the impact of sustainability on the health and well-being of sustainable energy industry workers, their customers, and those who are affected by their products and services.

GLO 9.2: Describe the sustainable energy industry's sustainability practices and their impact on the environment.

GLO 9.3: Describe the relationship between the economy and sustainability practices within the sustainable energy industry.

GLO 11.1: Demonstrate an understanding of the evolution of sustainable energy, including its technological progression and emerging trends.



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