The TeachAble Project

Lesson Plan

Grade 6: Wheels in Motion

A Unit for Grade 6 About Overcoming Barriers

Unit Summary

The focus of this mini-unit is accessibility for people with mobility impairment. Students will learn about some of the barriers that people with mobility impairment face, including some of the structural and accessibility challenges for people in wheelchairs. They will learn that wheelchairs are valuable mobility aids. They will learn about Canada's important contribution to the development of the electric wheelchair. They will discuss some concepts of Universal Design and how architectural design for wheelchair access can be helpful for everyone. They will have the opportunity to assume the perspective of a person who advocates for accessibility. Using scientific inquiry and experimentation skills, they will try to design a wheelchair incorporating an electric circuit.

Please see **Accessibility+** for information on mobility impairment and wheelchair design. Suggested books about wheelchairs are also included in this lesson.

Connections to Accessibility Awareness – The Big Ideas

The following accessibility messages are addressed in the activities in this unit:

- Students need to learn about different abilities and understand the challenges of living with a disability.
- A "barrier" is anything that prevents a person from fully participating in all aspects of society.
- Students can help to overcome barriers to learning in their classrooms and schools.
- What is necessary for some is good for all.

Important Considerations for Program Planning

In keeping with the inclusive tenets of accessibility and best teaching practices, lessons and instruction must provide a continuum of supports for all students, including those with accessibility considerations and/or special education needs. The front matter of all revised curriculum policy documents highlights elements to consider in planning classroom lessons and instruction, including Universal Design, differentiated instruction, equity and inclusive education, the perspective of First Nation, Métis and Inuit people, meeting the needs of English language learners and of students with special education needs. Please see the **Accessibility+** hub for more information.

NOTE TO THE TEACHER: If you have a student in your class who uses a wheelchair, a quick on-line reference is **Instructional Strategies to Support Students with Mobility Impairment** http://www.uleth.ca/ross/disabilities/mobility_impairments.html.

Community Connections

Connections with parents, members of the broader school community, agencies and institutions, social services, community organizations, corporations, and local businesses provide important opportunities for supporting accessibility awareness for students. Community partners can be an important resource in students' learning as volunteers, mentors, guest speakers, participants in the school's accessibility events or models of accessibility awareness in the life of the community. Modelling and mentoring can enrich not only the educational experience of students but also the life of the community. Schools should ensure that partnership initiatives are carried out within the context of strong educational objectives.

If the topic of a lesson is a disability and a child in the classroom has that disability, it is important to discuss that lesson with the child, if appropriate, and his or her parents so that planning can be respectful and strengths-based in perspective.

Curriculum Document(s)/Grade

The Ontario Curriculum, Grades 1 – 8: Language 2006: Grade 6 (revised)

The Ontario Curriculum, Grades 1 – 8: The Arts, Grades 1-8, 2009 (revised)

The Ontario Curriculum, Grades 1 – 8: Science and Technology, 2007 (revised)

The Ontario Curriculum, Grades 1 – 8: Social Studies 1-6, 2004; and History and Geography Grades 7 and 8, 2004 (revised)

Curriculum Expectations (as stated in the Ontario curriculum documents)

Language

ORAL COMMUNICATION:

By the end of Grade 6, students will:

2. Use speaking skills and strategies appropriately to communicate with different audiences for a variety of purposes

READING:

By the end of Grade 6, students will:

1. read and demonstrate an understanding of a variety of literary, graphic, and informational texts, using a range of strategies to construct meaning

WRITING:

By the end of Grade 6, students will:

2. Draft and revise their writing, using a variety of informational, literary and graphic forms and stylistic elements appropriate for the purpose and audience

Social Studies
By the end of Grade 6, students will:
Identify and describe Canada's economics, political, social and physical links with the United States and other regions of the world

Science and Technology
By the end of Grade 6, students will:
2. investigate the characteristics of static and current electricity, and construct simple circuits

The Arts
B. DRAMA
By the end of Grade 6, students will:
B1. Creating and Presenting: apply the creative process to process drama and the development of drama works, using the elements and conventions of drama to communicate feelings, ideas, and multiple perspectives

Instructional Components and Context

Learning Goals
Students and the teacher will work together to co-create Learning Goals that are clearly connected to the curriculum expectations of any particular activity and written in student friendly language. Co-created Learning Goals should be posted in the classroom for reference. Please see the Glossary in the **Accessibility+** hub for more information.

Success Criteria
Success Criteria for each lesson will be developed by the teacher and the class based on the curriculum expectation, the students' ability to demonstrate knowledge of content, use critical thinking process to make connections, and draw on personal knowledge or experience according to the nature of the activity. Co-created Success Criteria should be posted in the classroom for reference. Please see the **Accessibility+** hub for more information.

Differentiated Instruction and Assessment
Please refer to *Learning for All: A Guide to Effective Assessment and Instruction for All Students, Kindergarten to Grade 12* for more information about differentiated instruction and assessment practices.

Readiness

Students should have prior experience with:

- co-creating Success Criteria
- co-creating Learning Goals
- reflective writing
- being in role
- the Hot Seating drama convention (see the Glossary in the **Accessibility+** hub for more information)
- shared and guided reading strategies
- writing short paragraphs expressing their opinions
- with electrical terminology like circuit, current and battery
- constructing a circuit
- presenting their work to others
- writing up a science procedure

Terminology

Accessible, accessibility, advocacy, aluminum, architect, arena, barrier, battery, circuit, component, current, electric wheelchair, hot seating, joy stick, manual wheelchair, motorized wheelchair, mobility, physical disabilities, power chair, prototype, titanium, Universal Design

This terminology must be discussed and understood in order for students to meet the expectations of this lesson. These and other words that come up in discussion should be posted in the classroom for reference.

Materials and Equipment

Wheelchairs - Shared Reading Text (Appendix A)

Wheelchair - Shared Reading Text and Teacher's Background Information (Appendix B)

Chart paper and markers, an interactive white board or other way to record ideas

Dictionaries

Variety of building materials (blocks, paper plates, straws, spools, craft materials, string, glue, items students have brought in from home)

Components necessary to construct a circuit (see Science And Technology curriculum for grade 6)

Canadian Inventions (Appendix C) (optional)

Graphic Organizer (Appendix D) (optional)

Internet or library access for research activities (optional)

Suggested books and websites for readers of different levels:
Alex Is My Friend by Marisabina Russo
Arnie and the New Kid by Nancy L. Carlson
Just a Little Different by Bonnie Dobkin
Mama Zooms by Jane Cowen-Fletcher
Let's Talk About Being in a Wheelchair by Melanie Ann Apel
Mama Zooms by Jane Cowen-Fletcher
Rick Hansen: Canadian Hero by Edward O'Connor
Rick Hansen 25th Anniversary Educational Resources, K-12
http://www.rickhansen.com/schools
Rick Hansen Foundation http://www.rickhansen.com
Whoa, Nellie! by H. Benton
Witch's Fire by Beverly Butler
Zoom! http://robertmunsch.com/book/zoom

Activity # 1 – Wheelchairs (Appendix A) (Language)

This activity reinforces the following Accessibility Awareness messages:

- Students need to learn about different abilities and understand the challenges of living with a disability.
- A "barrier" is anything that prevents a person from fully participating in all aspects of society.

Minds On

Introduce the idea of a barrier being anything that prevents a person from fully participating in an activity. Ask the students for some examples of barriers they have experienced, with probing questions if necessary (height restrictions on a rollercoaster, age restrictions at the movies, not strong enough to lift something, eliminated from a team because couldn't run fast enough, fence too high to climb over). Ask them to think about what the words mobility and impairment might mean. Have a student check the meanings using a dictionary to verify. Discuss what the term mobility impairment means and how it impacts people. (This term is defined in the Glossary in **Accessibility+**.)

Action

WHEELCHAIRS: GROUP/SHARED READING; WRITING (APPENDIX A)
GROUPS OF 3 OR 4: GRAFFITI ACTIVITY

- Give each group a sheet of chart paper with a guiding question (similar to those in the list below) written at the top. Have them brainstorm ideas and then pass their sheet to a new group every couple of minutes until each group has written on every sheet. Ask each group to summarize the ideas on their page at the end.

• Guiding Questions: What do wheelchairs look like? Why might wheelchairs be designed this way? What are some things that are the same about different types of wheelchairs? What materials might be used to build wheelchairs? Where have you seen wheelchairs? Who uses a wheelchair? Are there different kinds of wheelchairs? Why do you think there are different kinds of wheelchairs? What is the difference between a manual (push) wheelchair and a motorized wheelchair? What types of users would prefer different kinds of wheelchairs?

• Ask students to think about why people might use a wheelchair. Using appropriate guiding reading strategies, introduce the Wheelchairs text, (Appendix A) to the class. Have students work in small groups to decode and discuss the text, identify unknown terminology, use dictionaries to find out what unfamiliar words mean and record questions they have about the text.

• Have a whole class discussion: Have you ever been "the new kid" and been nervous on your first day? What made you feel better? What does it mean to be "independent"? How important is it to you to be independent? How would you feel if you were unable to go into certain places because of your wheelchair? What are some barriers in our classroom/school/community that would make it hard for someone in a wheelchair? (entrances, stairs, fountains, the gym, shelves) What are some of the barriers in the school yard? (playground equipment, pushing a wheelchair on grass) Why do you think these barriers exist?

• Ask students to write a few phrases or sentences in their writing journals about some strategies they think would be helpful to welcome a new student to the class who uses a wheelchair. Have students share their ideas with the members of their group and then select a few to share with the whole class.

Assessment

ASSESSMENT FOR LEARNING: Are students able to participate in the shared reading strategy? Do the students have prior knowledge of wheelchairs? Have they had prior experience with using the dictionary? Are they able to answer the guided questions or are there certain questions that require more explicit teaching?

ASSESSMENT AS LEARNING: Are students engaged in an appropriate discussion of the guided questions? Are they able to participate in their groups? Are they able to contribute to whole class discussion? Are there any students who need peer or adult support? Are students able to summarize and share new learning? Are they developing a better understanding of wheelchairs, their use, styles and construction?

Are students able to use speaking skills and strategies to communicate with an audience? Are students able to read the text with understanding? Are students able to use the dictionary properly to look up unknown vocabulary?

Activity # 2 – The Development of the Electric Wheelchair (Appendix B) (Social Studies)

This activity will reinforce the following Accessibility Awareness message:

• Students need to learn about different abilities and understand the challenges of living with a disability.

Minds On

Ask students to list some of the ways Canada is connected to the United States and to other parts of the world (sports leagues, imports and exports, travel). Introduce the fact that Canada also contributed to the development of the electric wheelchair which is used throughout the world. Ask students for their ideas about why this contribution is an important one.

Action

WHEELCHAIR - SHARED READING: APPENDIX B

Using appropriate shared reading strategies, present *Wheelchair* (Appendix B) to the class. This text will introduce Canada's contribution to the development of the electric wheelchair and its influence on the larger world. Highlight that this contribution is an example of how Canada and Canadians have contributed to other countries and how a Canadian design has helped people living all over the world.

Ask students to work in small groups to think about the impact this contribution has had for people with mobility impairment and record some ideas. Share written responses with the whole class.

Possible Extensions

•Introduce the idea of Universal Design as the term for when something is good for different people for different reasons and in different circumstances. The wheelchair ramp is an example of Universal Design because it can be helpful for different people for different reasons (someone in a wheelchair, a mother with a stroller, someone pushing a shopping cart).Possible questions for students:

Can you think of some other examples of Universal Design (flexible straws to help young children drink but are also good for people in the hospitals, jar openers that make it easy for people with arthritis and everyone else to open a jar of pickles, large print books.) If students are having difficulty coming up with ideas, suggest some possibilities and ask why those are examples of Universal Design. Are there examples of Universal Design in our school or community?

• Ask students if they know of any other Canadian inventions or developments that have helped people all over the world. If they don't know of any, invite them to do some research on the topic. (See Appendix C, http://www3.sympatico.ca/taniah/Canada/thing or http://www.canada4life.ca/invent.php)

- Invite students to research Rick Hansen, David Onley, Justin Hines or Joshua Cassidy (or another Canadian with mobility impairment) to find out more about their lives and their accomplishments.
- Invite students to research sledge hockey, wheelchair basketball or some other wheelchair sport. Go to the Parasport Ontario website http://www.parasportontario.ca/Home.aspx or the Ontario Wheelchair Sports website http://ontwheelchairsports.org/en/ for information. They could share their findings with the class in an oral report or in the form of a poster or a PowerPoint presentation.

Assessment

ASSESSMENT FOR LEARNING: What prior knowledge do my students have about Canada's relationship with other countries? Are students able to transfer their prior knowledge of wheelchairs to this activity? Are they able to participate in the shared reading strategy to better understand the texts, *Wheelchair* and *Wheelchairs*? Are there any students who need peer or adult support or additional explicit teaching?

ASSESSMENT AS LEARNING: Are students able to work collaboratively to come up with some ideas about the impact of the development of the electric wheelchair for people with mobility impairment? Are they able to participate appropriately in their groups? Are they able to contribute to whole class discussion? Are there any students who need peer or adult support? Are students able to summarize and share new learning? Were students able to use speaking skills and strategies to communicate with an audience? Were students able to read the text with understanding? Were students able to use shared reading strategies to understand the text *Wheelchair* and *Wheelchairs*? Were students able to list some of Canada's other links to the United States and other parts of the world?

Activity # 3 – Let's Build an Accessible Arena! (Integrated Language and Drama)

This activity will reinforce the following Accessibility Awareness messages:

- A "barrier" is anything that prevents a person from participating in all aspects of society.
- Students can help to overcome barriers to learning in their classrooms and schools.
- What is necessary for some is good for all.

Minds On

Remind students of ideas and thoughts from earlier discussions about barriers and mobility impairment. Ask for examples to verify recall of these ideas or refer to written records of ideas. Do you think it would be fair if someone in a wheelchair couldn't watch his or her children skating because he or she can't get into the arena? Why or why not?

Action – Dramatic Activity – Hot Seating

NOTE TO THE TEACHER: Please read the articles in Accessibility + about the use of simulations as a teaching tool before going ahead with this activity or any other role play or simulation. Ensure that the drama activity is respectful in tone and focused on breaking down barriers to access rather than on the disability.

SCENARIO:

A new arena is being built in the community and the architects have asked members of the community and students for input into the design of the building. Students will have the opportunity to develop the role of a person who wishes to make the building more accessible for people who use wheelchairs.

OBJECTIVE OF THE ACTIVITY:

The purpose of this activity is to help students think about what barriers might make it difficult for a person in a wheelchair to get into or get around in the new arena and to think about ways people might work together to be sure that the new building is accessible and barrier-free. Another purpose is to consider the advantages of wheelchair accessibility for people without permanent mobility impairment (Universal Design).

GROUP DISCUSSIONS:

- Universal Design is a term that means what is necessary for some people is good for all people. Wheelchair ramps are an example of Universal Design. Ask students to think about a time when they have pushed the automatic door opener to get into a building or walked up a wheelchair ramp instead of taking the stairs. Who else might find it easier to use a wheelchair ramp than the stairs? Can students think of other examples of Universal Design? (large print books, FM systems in classrooms, books on tape, jar openers)
- What might we discover if we were able to interview the architect who is designing this building? What might we discover about accessibility if we were able to talk to a person who uses a wheelchair? Use the graphic organizer in Appendix D to stimulate thinking and discussion.

GUIDED PRACTICE: Students are assigned the role of a person from the community who wants to make sure that the new building fully is accessible. Put several students together to consider the issues and come up with some ideas about their desire to have the building built so that it is accessible. Give the groups some time to come up with questions they might want to ask, answers to the questions that they might be asked when they are in the "hot seat" or what their character might want to know or to say.

HOT SEATING: Ask for student volunteers to play the role of the architect who has been invited to the classroom to talk about accessibility issues in the new building. Other students take turns asking questions of the architect. Roles can be switched several times.

INDEPENDENT PRACTICE: Have a brief discussion about the word advocacy and what it means to advocate for something. Briefly brainstorm some reasons why the new arena should be completely accessible. Then assign the following independent task.

"You are a person who wishes to make sure that the new building is fully accessible. As an advocate for accessibility, you have been asked to write a short article for the newspaper about why accessibility for everyone is important and why it is important to insist on accessibility in the construction of the new building. Be sure you include some ideas to support your argument."

When they are finished, invite students to read their article aloud or post it in the classroom or elsewhere if they would like to share their work with the class or the school.

REFLECTIVE DISCUSSION: Lead the group through a reflective discussion after the role playing has ended using a graphic organizer as a guide. Did we get the answers we were seeking? Why/Why not? Did we treat the character the way we would treat a real guest to our classroom? What was different? What new information do we have now? Do you think writing letters to the newspaper would help in this situation? What else might help? What could we do as a class to help overcome barriers in our school or our community?

Assessment

ASSESSMENT FOR LEARNING: Are students able to participate in group discussions? Do they understand how to use a graphic organizer? Are they able to contribute ideas and questions to the graphic organizer? Do students feel comfortable participating in Hot Seating activities? Does the class need to review the Hot Seating convention? Are they able to write a short paragraph independently? Do some students need support?

ASSESSMENT AS LEARNING: Are they able to communicate their feelings, ideas and perspectives in role? Are they able to assume the role of an advocate for an accessible arena? Are they able to take their ideas and put them on paper in the form of a letter to the newspaper? Are they able to express their point of view? Were students able to use speaking skills and strategies to clearly communicate their ideas? Are students able to use the graphic organizer to help them formulate their ideas? Are they able to draft and revise their writing to communicate their feelings, ideas and perspectives for a particular audience?

Activity # 4 – Construction of a Wheelchair (Science and Technology)

This lesson will reinforce the following Accessibility Awareness messages:

- Students need to learn about different abilities and understand the challenges of living with a disability.
- A "barrier" is anything that prevents a person from fully participating in all aspects of society.

Minds On

Review the previous activities and discussions about mobility impairment and wheelchair development. Students should be able to list some of the mobility challenges faced by people in wheelchairs.

Introduce the idea of designing and manufacturing an improved design proto-type for a motorized wheelchair. How would you develop a plan and record the steps to produce it?

PROBLEM: You are a wheelchair designer responsible for designing a better wheelchair. How can you overcome or minimize barriers for people with mobility impairment by changing the design of the wheelchair?

After some time to think and share with a partner, ask students to share their ideas with the whole group.

Action – Designing a Better Wheelchair

NOTE TO THE TEACHER: This is an activity in which the students will practice the skills involved in scientific inquiry and technological problem solving, including:

- initiating and planning (e.g., asking questions, clarifying problems, planning procedures)
- performing and recording (e.g., following procedures, accessing information, recording observations and findings)
- analysing and interpreting (e.g., organizing data, reflecting on the effectiveness of actions performed, drawing conclusions)
- communicating (e.g., using appropriate vocabulary, communicating findings in a variety of ways)

Students should able to look critically at their proto-type and analyze how they built it, its pros and cons and what they learned from their construction. Their plan should include a step by step procedure of how the model was built, a list of advantages and disadvantages of their model and a reflection on what they've learned.

ACTIVITY:

Using inquiry and technological problem-solving skills, students will:

- discuss what kind of design would be realistic
- draft a plan to build a better wheelchair, including a step-by-step procedure
- build their wheelchair prototype including a circuit to make it move

• write up their procedure, and an analysis of the pros, cons and feasibility of their design
• write a reflection of the activity and their work explaining and demonstrating how their wheelchair works and how it would improve access at home, at school and in the community
• present their model to a partner, a small group or the whole class

Following the above steps, provide students with sufficient time, materials and support to build their prototype.

Assessment

ASSESSMENT FOR LEARNING: Are students able to discuss their ideas with a partner and share them with a group or the whole class? Are there students who will need assistance completing this activity? Are all students able to draft a plan? Are they able to write up a procedure? Who will be reluctant presenting to the class?

ASSESSMENT AS LEARNING: Are students able to participate in group discussions? Are they able to contribute ideas and questions? Are they able to communicate their feelings, ideas and perspectives in role? Are they able to assume the role of an advocate for an accessible arena? Are they able to take their ideas and put them on paper in the form of a letter to the newspaper? Are they able to express their point of view? Are they able to practice the skills involved in scientific inquiry and technological problem solving, including:

• initiating and planning (e.g., asking questions, clarifying problems, planning procedures)
• performing and recording (e.g., following procedures, accessing information, recording observations and findings)
• analysing and interpreting (e.g., organizing data, reflecting on the effectiveness of actions performed, drawing conclusions)
• communicating (e.g., using appropriate vocabulary, communicating findings in a variety of ways)

Consolidation

Did students demonstrate an understanding of the Big Ideas of Accessibility Awareness? Using probing questions if necessary, try to elicit key ideas related to the Accessibility Awareness statements for this unit:

• Students need to learn about different disabilities and understand the challenges of living with a disability.
• A “barrier” is anything that prevents a person from fully participating in all aspects of society.
• Students can help overcome barriers to learning in their classrooms and schools.
• What is necessary for some is good for all.

Invite students to share their thoughts about the lessons in this unit though discussion, writing or artistic means. Students could talk to a partner about what they learned, small groups could cooperatively list some of the words and ideas from the unit, or students could individually or collaboratively make a poster or a mural showing what an inclusive and accessible arena (or classroom) would look like.

POSSIBLE GUIDING QUESTIONS: What new words did you learn? What new ideas did you learn about? What did you learn about mobility impairment? What did you learn about wheelchair design? Did you become more aware of barriers in our classroom, school and community?

Ask students to think about what they have learned about the rights of people who use wheelchairs and Universal Design. Ask students to write down some of the ideas in their journals. As a class, have a discussion about what the top five most important ideas might be. Ask students to explain why they think the ideas belong on the list.

Teacher Reflection

- Did the intended messages about accessibility and barriers come across in my lesson?
- Did I incorporate student-friendly teaching strategies that support best practices that incorporate accessible methods and materials to reach as many students as possible?
- Are the resources I selected appropriate for the grade level and varied to meet the needs of all my students? If the resources I selected presented aspects of accessibility awareness, was the perspective strength based?
- Did I use Differentiated Instruction and Assessment to meet the varying learning styles of my students? Was I able to meet and accommodate for all of my students' learning needs?
- Were all my students engaged at all steps of the lesson? How do I know?
- Were my assessment procedures fair and equitable? Have I demonstrated best practices and met the individual needs of my students? Have I accommodated in fair and equitable ways for students with special learning needs to demonstrate their understanding? Did I provide opportunities for my students to reflect on their learning to improve their work? Were the students successful? How do I know?
- How do I ensure that the concept of accessibility is not only discussed but embedded in all conversation topics taught in the classroom?
- How could this lesson be improved in the future?
- How can I improve my own teaching practice to better address accessibility awareness issues?
- Was I able to make connections or forge partnerships with parents or members of the community as part of this unit?
- How do I help promote accessibility awareness across my school and school board and share the results with parents and colleagues?

Appendix A

Wheelchairs

Daniel was dreading the first day at his new school. Anyone would be a little nervous to be starting at someplace new, but Daniel was extra-worried because he uses a wheelchair. He wondered how the other students would react. Would they stare and make fun of him?

On the first day of school, he rolled into his new classroom and met his teacher. She asked if it would be OK to talk to the class about his wheelchair and Daniel agreed. Whew! He felt so relieved when she did. Mrs. Boyle told everyone that wheelchairs are just a good way of getting around if a person has trouble walking. "It helps Daniel be independent," she said.

What Does a Wheelchair Do?

Daniel's motorized wheelchair was nothing like the old-fashioned kind you sometimes see. No longer are wheelchairs heavy and difficult to maneuver. Today's wheelchairs are lighter, faster, and easier to use. Many use computer technology and offer better support for a person's back, neck, head, and legs. They also include safety features such as automatic brakes and anti-tipping devices.

Power wheelchairs have many advantages for students who need them. Electronic controllers can help a student who uses a wheelchair drive smoothly, brake easily, and make the wheelchair move with the touch of a hand or even by puffing on a special straw! Some hand controllers look like a joystick used to play video games and are easy to operate.

Who Needs a Wheelchair?

People can need wheelchairs for many different reasons. Some have had injuries either to their legs or spine, which controls leg movement. Others have disabilities due to muscular dystrophy or cerebral palsy. In some cases, students have wheelchairs but don't need to use them all the time. For example, they might be able to walk with the aid of crutches or a walker sometimes. Rick Hansen, David Onley, Justin Hines and Joshua Cassidy are well-known Canadians who use wheelchairs to help them be mobile.

What's Life Like?

People who use wheelchairs usually fall into two categories: people who use them for a short time (for instance, students who broke a leg or had surgery) and those who use them for a long time, or permanently. Even though students who use a wheelchair for a short time may feel frustrated or sad about relying on others to get around, they know that someday the wheelchair won't be necessary.

For students who depend on a wheelchair for the long term, life is different. They'll need to learn how to use the wheelchair in lots of different situations — at home, in school, while away on vacation. In some cases, it will be hard to use the wheelchair or it might take a long time. That can be frustrating, but wheelchairs are getting better all the time. And researchers

continue to look for treatments and cures for the medical problems that lead to paralysis.

People who use wheelchairs can shop, work, go to school, play, drive cars — even compete in some special types of sports competitions. But they also must look for accessible buildings, special ramps, parking places, and environments that are wheelchair-friendly. Not everyone is as accepting as Daniel's teacher and classmates, so life can be hard for someone who uses a wheelchair. A person may be teased, feel left out, and get treated differently than other students.

The next time you see a person using a wheelchair, try to be a friend. Usually, students in wheelchairs don't need to be pushed around, but they might need other kinds of help. Opening a door or clearing the path will be appreciated. But the best help of all is to be kind and friendly and not to tease or stare. People who use wheelchairs are the same as everyone else. They just get around on wheels instead of feet!

Adapted from an article at http://studentshealth.org/PageManager.jsp?dn=StudentsHealth&lic=1&ps=307&cat_id=112&article_set=20757.

Original article published by the StudentsHealth.org The most-visited site devoted to children's health and development.

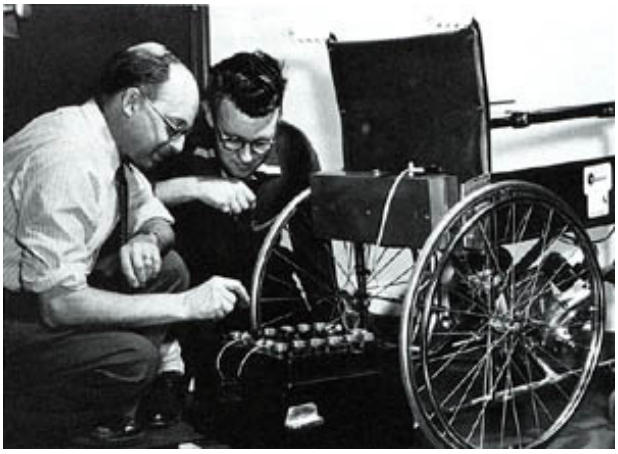
Appendix B

Wheelchair

Canadians have made an important contribution to the development of the electric wheelchair which is used around the world. George Klein (1904 – 1992), from Hamilton, Ontario, created a very successful type of the motorized wheelchair. Before him, motorized wheelchairs were extremely heavy and extremely expensive. George Klein wanted to come up with a more affordable and useable wheelchair design in order to help soldiers who were wounded during World War II. Many features of Mr. Klein's design are still used in wheelchair design today, such as the joy stick and drive system. The prototype of this wheelchair was originally given to the United States as a symbol of Canada's efforts to help people with disabilities all over the world. But the United States returned the chair to Canada in 2005 in recognition of George Klein's contributions. George was inducted into Canada's Science and Engineering Hall of Fame in 2005 and the original wheelchair is now on display at the Canada Science and Technology Museum in Ottawa.

During his lifetime, George worked with some important agencies: the National Research Council of Canada, the Canadian Paraplegic Association and Canada's Department of Veteran Affairs. These agencies help support Canadians with disabilities. There are many more agencies in Ontario, in Canada and throughout world who, like those which worked with George Klein, help persons with disabilities get the equipment they need to overcome barriers that they might face. They also help all of us learn and think about what we can do to make the world more accessible for everyone.

Even with a modern, motorized wheel, people in wheelchairs may face barriers that make it hard for them to move around in homes, our classroom, our school and our community. Wheelchairs can be very heavy because they are made of sturdy metal, usually titanium or aluminum. Motorized wheelchairs are heavy because of their batteries and electrical components. Manual wheelchairs can be very heavy to push, especially on some surfaces. Some wheelchairs need to fold up to fit into cars, but because they need to fold, they are even heavier. If an electric wheelchair's battery dies, they are extremely difficult to push. Are there any other barriers that would make it difficult for a person in a wheelchair to move around in our homes, our classroom, our school or our community?



A photo of George Klein working on his wheelchair proto-type. Source: VISIONARIES: Canadian Triumphs, the sixth volume in the CANADA Heirloom Series. http://epe.lac-bac.gc.ca/100/205/301/ic/cdc/heirloom_series/volume6/volume6.htm

Appendix C

Canadian Inventors

(http://inventors.about.com/od/cstartinventions/a/Canadian.htm)

Only a small percentage of the great inventions of Canadian inventors are listed below:

- 5 Pin Bowling invented by T.E. Ryan of Toronto in 1909
- Able Walker. The walker was patented by Norm Rolston in 1986
- Access Bar, patented food bar designed to help burn fat by Dr Larry Wang
- Air-Conditioned Railway Coach invented by Henry Ruttan in 1858
- Abdominizer, the infomercial exercise darling, invented by Dennis Colonello in 1984
- AC Radio Tube invented by Edward Samuels Rogers in 1925
- Acetylene. Thomas L. Wilson invented the production process in 1892
- Acetylene Buoy invented by Thomas L. Wilson in 1904
- Agrifoam Crop Cold Protector co-invented in 1967 by D. Siminovitch & J. W. Butler
- Analytical Plotter 3D map-making system invented by Uno Vilho Helava in 1957
- Andromonon, three-wheeled vehicle invented in 1851 by Thomas Turnbull
- Anti-Gravity Suit, a suit for high altitude jet pilots, invented by Wilbur Rounding Franks in 1941
- Automatic Foghorn, the first steam foghorn was invented by Robert Foulis in 1859
- Automatic Machinery Lubricator, one of the many inventions invented by Elijah McCoy
- Automatic Postal Sorter invented in 1957 by Maurice Levy. It and it could handle 200,000 letters an hour
- Basketball invented by James Naismith in 1891
- Bone Marrow Compatibility Test invented by Barbara Bain in 1960
- Bromine – a process to extract Bromine was invented by Herbert Henry Dow in 1890
- Calcium Carbide Process invented by Thomas Leopold Willson in 1892
- Canada Dry Ginger Ale invented in 1907 by John A. McLaughlin
- Chocolate Nut Bar – the first nickel bar was made by Arthur Ganong in 1910
- Computerized Braille invented by Roland Galarneau in 1972
- Creed Telegraph System. Fredrick Creed invented a way to convert Morse Code to text in 1900
- Compound Steam Engine invented by Benjamin Franklin Tibbetts in 1842
- CPR Mannequin invented by Dianne Croteau in 1989
- Electric Car Heater invented by Thomas Ahearn in 1890

- Electric Cooking Range, first invented by Thomas Ahearn in 1882
- Electric Light Bulb. Henry Woodward invented an electric light bulb in 1874; sold the patent to Thomas Edison
- Electron Microscope co-invented by Eli Franklin Burton, Cecil Hall, James Hillier, Albert Prebus in 1937
- Electric Organ. Morse Robb of Belleville, Ontario, patented the world's first electric organ in 1928
- Electric Streetcar. John Joseph Wright invented an electric streetcar in 1883
- Fathometer. An early form of sonar invented by Reginald A. Fessenden in 1919
- Film Colourization invented by Wilson Markle in 1983
- Garbage Bag (polyethylene) invented by Harry Wasylyk in 1950
- Goalie Mask Invented by Jacques Plante in 1960
- Gramophone co-invented by Alexander Graham Bell & Emile Berliner in 1889
- Green Ink Currency ink invented by Thomas Sterry Hunt in 1862
- Half-tone Engraving co-invented by Georges Edouard Desbarats and William Augustus Leggo in 1869
- Heart Pacemaker invented by Dr. John A. Hopps in 1950
- Hydrofoil Boat co-invented by Alexander Graham Bell and Casey Baldwin in 1908
- IMax Movie System co-invented in 1968 by Grahame Ferguson, Roman Kroitor, and Robert Kerr
- Instant Mashed Potatos. Dehydrated potato flakes were invented by Edward A. Asselbergs in 1962
- Insulin Process. Fredrick Banting, J. J. Macleod, Charles Best and Collip invented the process for insulin in 1922
- JAVA Software programming language invented by James Gosling in 1994
- Jetliner. The first commercial jetliner to fly in North America was designed by James Floyd in 1949. The first test flight of the Avro Jetliner was on August 10 1949.
- Jolly Jumper, baby's delight invented by Olivia Poole in 1959
- Kerosene invented by Doctor Abraham Gesner in 1846
- Lawn Sprinkler, another invention made by Elijah McCoy
- Light Bulb Leads, made of nickel & iron alloy, were invented by Reginald A. Fessenden in 1892
- Marquis Wheat invented by Sir Charles E. Saunders in 1908
- McIntosh Apple invented by John McIntosh in 1796
- Music Synthesizer invented by Hugh Le Caine in 1945
- Newsprint invented by Charles Fenerty in 1838
- Odometer invented by Samuel McKeen in 1854

- Paint Roller invented by Norman Breakey of Toronto in 1940
- Plexiglas Polymerized Methyl Methacrylate invented by William Chalmers in 1931
- Polypump Liquid Dispenser. Harold Humphrey made pumpable liquid hand soap possible in 1972
- Portable Film Developing System invented by Arthur Williams McCurdy in 1890, but he foolishly sold the patent to George Eastman in 1903
- Potato Digger invented by Alexander Anderson in 1856
- Process to Extract Helium from Natural Gas invented by Sir John Cunningham McLennan in 1915
- Prosthetic Hand – an electric prosthetic invented by Helmut Lucas in 1971
- Quartz Clock first developed by Warren Marrison
- R-Theta Navigation System invented by J.E.G. Wright in 1958
- Radio-Transmitted Voice invented by Reginald A. Fessenden in 1904
- Railway Car Brake invented by George B. Dorey in 1913
- Railway Sleeper Car invented by Samuel Sharp in 1857
- Robertson Screw invented by Peter L. Robertson in 1908
- Rotary Blow Molding Machine Plastic bottle maker invented by Gustave Côté in 1966
- Rotary Railroad Snowplow invented by J.E. Elliott in 1869
- Rubber Shoe Heels. Elijah McCoy patented an important improvement to rubber heels in 1879
- Safety Paint, a high reflectivity paint, invented by Neil Harpham in 1974
- Screw Propeller. Ship's propeller invented by John Patch in 1833
- Silicon Chip Blood Analyzer invented by Imants Lauks in 1986
- SlickLicker, made for cleaning oil spills, patented by Richard Sewell in 1970
- Snowblower invented by Arthur Sicard in 1925
- Snowmobile invented by Joseph-Armand Bombardier in 1958
- Standard Time invented by Sir Sanford Fleming in 1878
- Stereo-orthography Map Making System invented by T.J. Blachut, Stanley Collins in 1965
- Superphosphate Fertilizer invented by Thomas L. Wilson in 1896
- Synthetic Sucrose invented by Dr. Raymond Lemieux in 1953
- Television System patented by Reginald A. Fessenden in 1927
- Television Camera invented by F. C. P. Henroteau in 1934
- Telephone invented by Alexander Graham Bell in 1876
- Telephone Handset invented by Cyril Duquet in 1878
- Tone-to-Pulse Converter invented by Michael Cowpland in 1974
- Trivial Pursuit invented in 1979 by Chris Haney and Scott Abbott

- Tuck-Away-Handle Beer Carton invented by Steve Pasjac in 1957
- Undersea Telegraph Cable invented by Fredrick Newton Gisborne in 1857
- UV-degradable Plastics invented by Dr. James Guillet in 1971
- Variable Pitch Aircraft Propeller invented by Walter Rupert Turnbull in 1922
- Walkie-Talkie invented by Donald L. Hings in 1942
- Wireless Radio invented by Reginald A. Fessenden in 1900
- Wirephoto first invented by Edward Samuels Rogers in 1925
- Zipper invented by Gideon Sundback in 1913

Appendix D

Graphic Organizer

Note: This chart could be reproduced on chart paper. Students could work in groups to fill out each section of the chart and then share their ideas.

What do we know about planning for Universal Design and accessibility?	What do we want to ask the architect and builder about Universal Design?	What might we discover about Universal Design and accessibility if we talked to a person who uses a wheelchair?