



Playful Activities: Development of Cognitive Skills using Robots

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This is a resource for parents of children with physical limitations. Typically developing children learn and develop their cognitive, language, social, and motor skills by interacting with their environment. For example, playing with toys and physically manipulating objects help children learn vocabulary and language concepts about those objects, as well as their properties. Children with physical limitations may not be able to explore their world in this way, and so their opportunities for learning are more limited. Robots can be used to provide children with a means to play and learn where they might otherwise be unable to. This resource manual shows parents a variety of ways in which robots can be used to help promote their child's development through a number of fun learning activities.

Abstract

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Process and Purpose of the Project

This project was motivated by the need to provide parents with a home-based resource manual which would contain easy to implement activities in an effort to enhance their children's learning opportunities. In preparation for creating this manual, a literature review was completed in order to obtain relevant information on resource design. As well, videos were reviewed from a previous robot project, by Cook, Adams, Volden, Harbottle, & Harbottle (2011), to provide insight into the types of robot activities previously designed for children with physical disabilities.

When learners are immersed in hands-on activities, their learning experience is enhanced. To promote optimal learning in language development, learners require experiences where the target word applies within an actual activity, so that images and actions can be tied to the word itself (Gee, 2008). This notion also applies to children with physical or cognitive disabilities and/or delays. This parent resource manual provides activities where a parent interacts with the learner in various experiences that are conducive to language development and learning. This relationship fosters the growth of a child's repertoire with words and experiences that occur in different situations (Gee, 2008).

Parent teaching is likely to be successful when parents are interested in being involved in the process and consider this involvement as a priority for themselves and their child (Kaiser & Hancock, 2003). It is essential to have sufficient time and a willingness to make a long term learning commitment to engaging one's child in interactive play experiences. Parent support from close family members and friends is also a predictor of successful implementation (Kaiser & Hancock, 2003). The intent of this resource manual is for parents to incorporate these activities into daily play time so that it is not considered an 'extra' task that a parent has to accomplish in a day.

When carried out effectively, parent resource manuals can improve learning for the child; however, some limitations exist when implementing a home based treatment program. In a study evaluating the effectiveness of home based treatment for young children with autism, Ozonoff and Cathcart (1998) suggested that this form of treatment required a large time commitment by parents. Additionally, some programs are expensive which may result in a financial burden on families. It also is noted that the implementation of home therapy may strain an already stressed family. Finally, it was identified that most children receiving home therapy were also enrolled in regular educational programs during the day (Ozonoff & Cathcart, 1998). It is difficult to separate which program (i.e., educational programs or home therapy) caused an increase in learning, or if it was the combination of programs that was helpful. Due to these four considerations, we emphasize to parents that they should evaluate the potential limitations and benefits of a home based treatment before taking part in a program.

Previous research has demonstrated that parent resource manuals are most effective when combined with training from a professional expert (Ainbinder et al., 1998). It is also helpful for parents to be in support groups, which create a supportive atmosphere and provide opportunities for parents to see they are not alone (Ainbinder et al., 1998). Since this project consists of only a resource manual, these limitations are not addressed; however, it is recommended that parents



utilize the manual's supports (e.g., additional pictures, recommended cues) and/or seek out support from professionals if further assistance is needed (e.g., speech-language pathologists, occupational therapists, special education teachers, technology assistants, etc.).

To date, there is minimal research about parent resources using robots for children with physical and cognitive delays. However, research is currently being conducted by the Puckett Institute on the use of robots in promoting joint attention in children with cognitive delays/disabilities (e.g., Autism, Down Syndrome). The primary focus of the study is to evaluate the robots and determine their potential use for social communication (Denver Metro Community Parent Resource Center, n.d.). The use of robots in therapeutic intervention could benefit from further research.

Taking the limitations and benefits of home-based resource manuals into consideration, this parent manual was created to help parents enable their child to have the opportunity to participate in play based activities. The resource is written in a parent-friendly style so that the reader will not get lost in "professional" jargon, but rather will be able to read the instructions and implement the activities immediately.

To promote learning success within the home environment, a positive social interaction between the parent(s) and the child is encouraged. The activities designed in this manual foster positive interaction, as the learning is play-based. Parents will be able to teach their child in a relaxed manner, while engaging their child and having fun!

Recommendations

The following are recommendations for future work that may contribute to the improvement and further development of this project. These recommendations stem from student reflection as well as feedback from a content expert.

1. Trials

- a) Trialing the use of this manual with parents could provide constructive feedback on the appropriateness of the manual design as well as how "user friendly" the manual and activities are to implement.
- b) Trialing the activities with children, who have limitations, in target developmental stages could provide insight into the appropriateness and enjoyment of the activities as well as possible activity modifications.

2. Considering "Play"

- a) In the parent manual, many of the activities are highly structured to provide the child with sufficient support in learning the cognitive concepts; however, it is important to remember that children learn through play and acquire many skills in unstructured environments. Adding the element of "playfulness" could ensure that using the robot is meaningful, fun, and natural for the child. Creating more activities within the manual, which focuses on the principle of "learning by doing" in unstructured settings, could contribute to natural development and "discovery play".



- b) Learning through “social play” is an additional feature of child development; this component could be considered further within the manual. Many cognitive skills are acquired by interacting with others, including peers, siblings, and parents. Including play partners can enhance learning and provide “teachable moments” where children learn from others and develop social skills (e.g., turn taking, sharing, using empathy). In the resource manual, the parent primarily plays the role of the facilitator; however, it is recommended that parents, siblings and peers participate in these activities as “play partners” (i.e., being immersed in the activity and taking the child’s lead). Highlighting these interactions could be considered for further work in activity development.

3. Additional Supports

- a) Including video demonstrations of the activities could provide additional support for parents in the set up and execution of each activity. A video demonstration could also exemplify proper modeling on how to interact with the child during the activity.
- b) Providing additional resources for parents (e.g., books, websites) could give them further ideas and suggestions for how to incorporate the robot into their child’s daily life. This could also provide additional support for creating further activities that are fun and “play based”.



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Introduction to Parents

This materials kit is designed to support you and your child as you use robots to promote learning in a fun, engaging, and meaningful way! It is our intention that this user-friendly resource will provide you and your child with opportunities to participate in everyday life activities.

Limitations in Opportunities to Learn and How Robots can Help

Each child, regardless of his/her communication skills or physical limitation(s), comes to the learning process with a unique blend of needs and skills that ultimately impact language learning. Most often, the environment does not accommodate children with these limitations; therefore, access to different learning opportunities can be limited. For example, it may be difficult for a child to hold a pencil and/or manipulate objects. Robots have been shown to provide children who have physical limitations with the opportunity to participate in everyday activities that may otherwise be out of their reach. In this way, the child can use a robot to hold a pencil and/ or manipulate the objects. The ability to participate in these activities provides the experience for learning in multiple areas, including language (e.g., building vocabulary), motor (e.g., building a tower out of blocks), cognitive (e.g., solving a problem), play (e.g., pretending to play “house”), and social skills (e.g., interacting with peers). The aim is to reduce the limitations your child may experience and provide a means for your child to communicate.

Research has shown that robots can serve as a means for children to independently interact with real objects and actively participate in their environment (Cook & Adams, 2010). When children learn to control a robot, they are given more opportunities to explore and learn through ‘doing’. In order for children with disabilities to have an opportunity to learn and interact in their environments, these assistive technologies and strategies must be made available. Low cost educational robots that can be easily accessed, built, and programmed are ideal facilitative learning devices. The robot can be modified (e.g., more control switches can be added once the child establishes causality) to meet the needs of a child as s/he grows and develops.

Purpose of this Manual

This manual will serve as an instructional resource for parents to implement assistive robot technology at home and in the classroom.

In addition, this manual includes specific activities that represent a step by step progression of cognitive development (i.e., moving from basic understanding that the switch moves the robot (simple) to using the robot to solve a problem (complex)). Each activity will build on the previous one in complexity, providing children with an opportunity to perform at a successful level while offering the potential to advance to more complex tasks. The activities are play-based and focus on encouraging your child to communicate with others in his/her environment.

It is our hope that using the robot will enhance your child’s quality of communication, and empower him/her to continue to learn and interact with others. We encourage you to use the activities in a way that will best support you and your child’s communication needs. These activities serve as guidelines only, and can be modified to suit your preferences! Remember... KEEP IT FUN!



What You Need to Know about Robots

What a Robot is: A robot is a device that can be programmed for different purposes and activities and is not limited to any specific size or shape. Robots are commonly used in the rehabilitation of children and adults with disabilities. They can be programmed in a variety of ways to provide different levels of support based on the needs of an individual (Cook, Encarnacao, & Adams, 2010). Robots are widely used to maneuver and manipulate objects in different environments (Cook et al., 2010).

What a Robot can do for your Child: Children with physical disabilities may have difficulty playing with toys and manipulating objects. As a result, their quality of play is decreased and their learning of skills may be compromised (Cook et al., 2010). Research has demonstrated that robots allow these children the opportunity to learn and develop a variety of skills through play and interaction with their environment. Robots give children with disabilities an opportunity to interact, learn, and enhance their developmental skills (Cook et al., 2010).

Activity Skills: The activities in this manual are designed according to a hierarchy of concepts/skills. These skills are listed below from simple to most complex. Your child should understand the earlier concepts before moving on to the more complex activities.

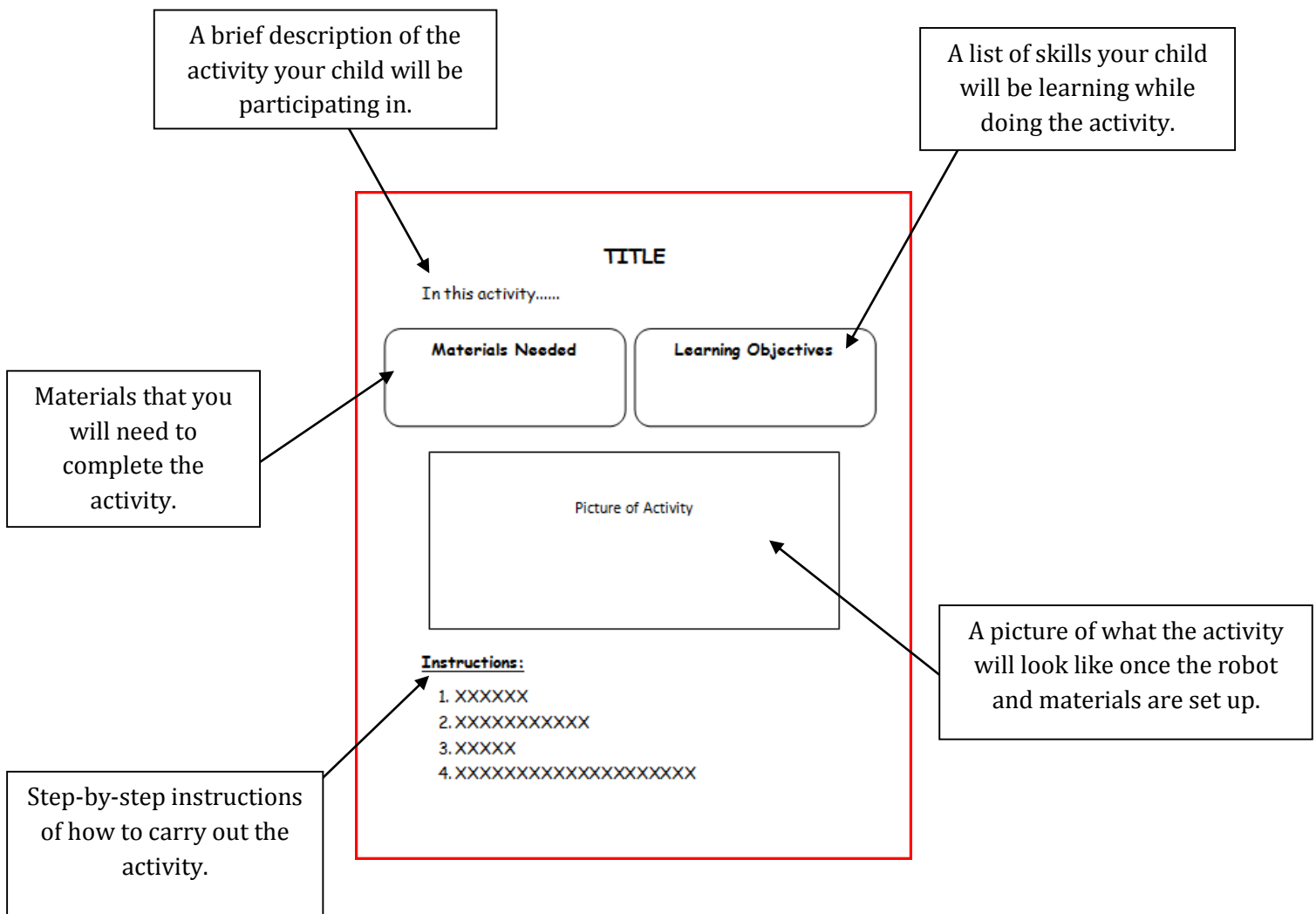
Skill Level	Definition of Skill for Robot Activity	Difficulty of Skill
Cause and Effect	The child understands that pressing a switch causes the robot to move.	Simple
Inhibition	The child understands that taking his/her hand off of the switch causes the robot to STOP moving.	
Binary Relations	The child understands that two different switches cause two different actions. For example, pressing one switch causes the robot to turn to the right, while pressing another switch causes the robot to move left. This also applies for forward/backward binary directions.	
Spatial Relations	The child understands that multiple switches cause the robot to move in multiple directions. Further, these directions can be combined to move the robot to a specific target (ex. forward, then left, then forward, then right, then forward again).	
Symbolic Play	The child understands that robot can be used to manipulate objects in imaginary play. For example, a child may pretend that s/he is shopping for groceries by using toys to represent grocery items.	
Problem Solving	The child understands that the robot can be used to solve a problem. The robot is manipulated in an intentional way (i.e. not just by trial and error) to solve a problem. For example, a child could use the robot to put together a puzzle.	

(Modified from Cook, Adams, Volden, Harbottle, & Harbottle, 2010)

Finding Your Way Around the Manual

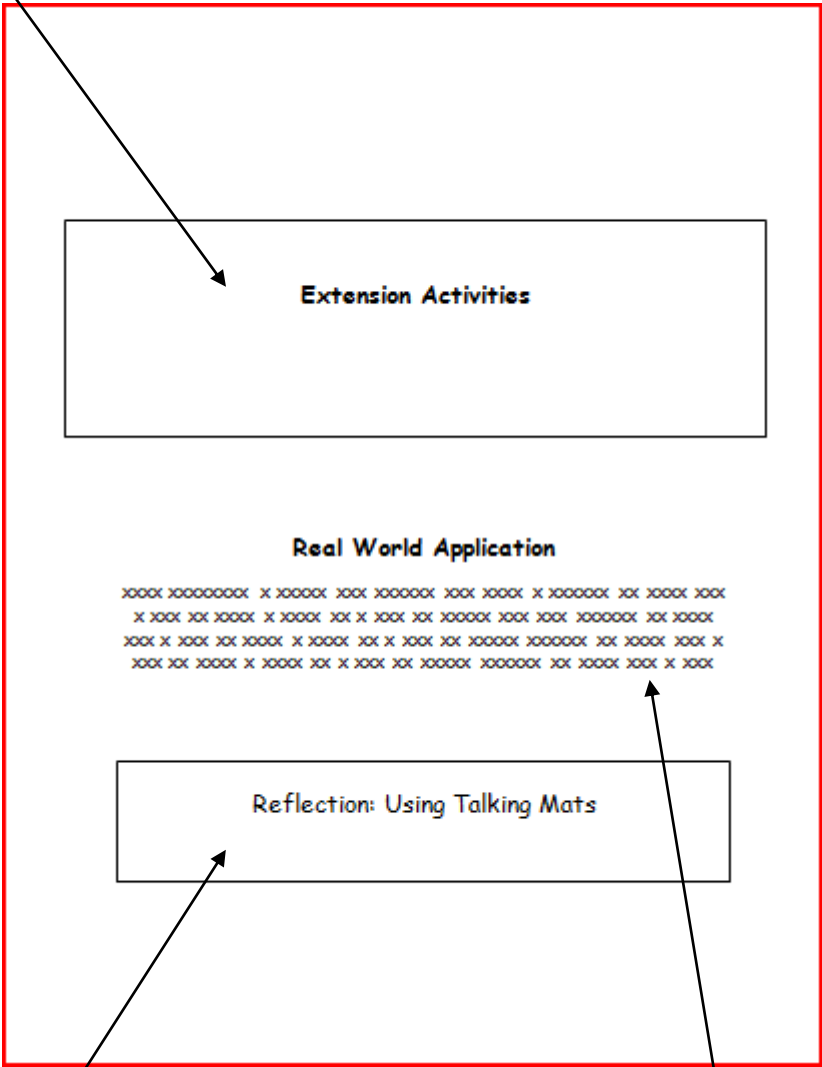
Getting Started: The “Getting Started” activities are designed to introduce skills that your child needs to understand in order to complete the main activity. They serve as preliminary activities in which you are explicitly teaching a concept. These activities allow your child to practice the concepts in a fun and simplistic way before moving ahead in the manual. You can choose any of the “Getting Started” activities for each section. Choose one that matches the interests of your child! It is recommended that your child successfully complete at least one of these “Getting Started” activities before moving on; however, you may do them all if you choose!

Activity Outline:





After your child has successfully completed the main activity independently, use these extension activities as a guide to further your child's language development.



Once you have finished an activity with your child, it is important to ask him/her how s/he felt about the activity. This way, you can change the activity, if need be, so that it is more enjoyable for your child in the future. Using a tool called Talking Mats is a great way to get your child's feedback.

A description of Talking Mats can be found on page 12.

This section shows how your child can use his/her robot in a real-life situation. Your child is able to apply the skills learned in this activity to help him/her in everyday decision-making situations.

A Note on Extension Activities: The purpose of the “Extension Activities” is to provide an extension of the activity your child has just completed. It should be noted that these are only suggestions and the activities should be adapted to the appropriate level of your child. The primary goal of these activities is to develop vocabulary and language using your child’s developing robot skills. Research has demonstrated that children learn best by doing. When a word is paired with an associated action, learning becomes much more meaningful to the child (Gee, 2008). For example, when learning the meaning of “go,” your child will be able to associate the meaning of “go” with the action of the robot moving forward.

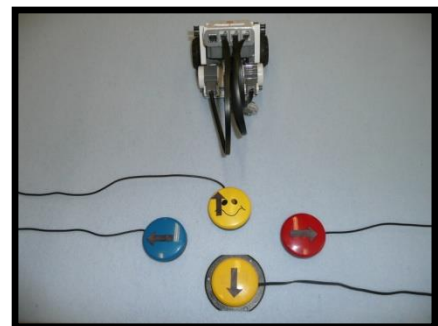
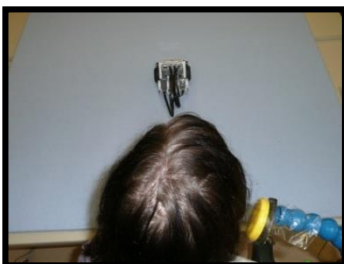
It is important to note that parents should use appropriate language that is both functional and relevant for your individual child and the activity. For example, if your child enjoys playing with cars, the vocabulary words for the activity may include: go, stop, drive, turn, vroom, beep beep.

A Note on Real World Application: The ultimate goal for “Real World Application” is to enable your child to make decisions and participate in everyday life. This will encourage your child to independently use the robot in unstructured activities that will improve his/her ability to make requests, comments, and choices. The suggested “Real World Applications” that are provided in the manual are templates that can be revised to suit your family’s needs and the interests of your child.

A Note on Accompanying Pictures:

Switches and modifications: The switches in the pictures are set up in a specific way: The yellow smiley face switch represents forward movement while the plain yellow switch represents backward movement. The red switch is used for ‘right’ movement and the blue switch is used for moving left. This set up is simply a guide. You may set up the switches in whatever way makes the most sense to you. However, it is important to always be consistent in your set up of the switches because it will help your child to become familiar with the routine.

The switches may also be modified to assist your child’s learning. For instance, you may use black arrows on top of the jelly bean switches to indicate the direction the switch will move the robot.



In addition, you can modify the placement of the switches to be accessible to children who do not have the mobility to press a switch with his/her hands. Switches can be placed accordingly so that they can be activated with the head or elbows instead of hands.

Additional picture supports: Some activities may need the support of a picture to help you set them up. When an activity has a camera icon at the bottom of the explanation, it means that there is a corresponding picture reference listed to help guide you!

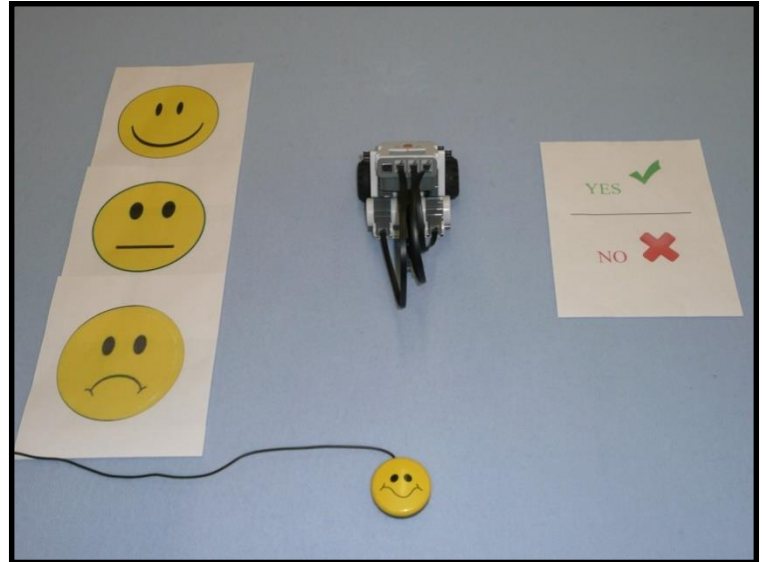




A Note on Using Talking Mats for Reflection:

While working through these activities it is important that your child has the opportunity to reflect, express his/her opinions, and make choices. Talking Mats is “a visual framework that uses picture symbols to help people with a communication difficulty understand and respond more effectively” (Murphy, Tester, Hubbard, Downs, & MacDonald, 2005, p. 97). Talking Mats will give your child a voice by allowing the opportunity to share his/her feelings. For instance, after asking your child if s/he enjoyed the activity, your child may choose between faces (e.g. happy, neutral, sad) to describe how s/he felt about the task. This will help you identify your child’s level of interest and enjoyment, as well as whether or not you should continue with that particular activity again.

Parents are encouraged to adapt this tool to suit your child's needs (e.g., written words: exciting, okay, boring or other symbols to represent this: green, yellow, red traffic lights).



How to Support Your Child With the Activities: Your child may initially have difficulty with some of the activities. In order to complete the activity successfully, you may need to encourage your child by providing additional help or support. Below is the suggested order in which to provide assistance to your child. The cues go from least support to most support. It is suggested that you wait 30 seconds for your child to respond to an instruction before providing one of the prompts below. Wait 30 seconds after providing one of the prompts before moving on to a more supportive prompt.

The Cueing Hierarchy

1. Provide a gesture to indicate what your child should do. For example, point to the location your child needs to direct the robot.
2. Ask your child, verbally, to move the robot towards the desired object. Try to make your instructions more about moving the robot rather than about hitting a switch to move the robot.
3. Ask your child, verbally, to hit the specific switch required to move the robot in order to complete the activity.
4. **Model** the action for your child by pressing the switch yourself and also provide verbal instructions about what you are doing.
 - **Modeling:** It is often helpful to provide a model to support your child's learning. When a person can see what needs to be done, s/he has a better chance of accomplishing the task on



her own. For instance, in a task where you want your child to navigate an obstacle course, you could provide a model by navigating the obstacle yourself first.

5. Use the **hand-over-hand** technique to help your child hit the correct switch. At the same time, provide a verbal instruction to press the switch.

- **Hand Over Hand:** This technique can be used to support your child at a basic level. For instance, in an activity where your child must press a switch to move the robot, you could place your hand on top of your child's hand. Move his/her hand to the switch, and press the switch together.

Remember to use:

Encouragement: It is important to encourage your child throughout the activities. Encouragement could be any type of positive comment, even when the activity is not going well. You could say something such as, "Good try" or "You did that all by yourself!" Positive comments like these will help keep your child motivated throughout the activities.

Feedback: Throughout the manual you may be asked to provide your child with feedback about his/her performance. Feedback should be as specific as possible so that your child knows what s/he did right, or whether s/he needs to make changes. For example, if the robot moved in the wrong direction you could say, "This button makes it go this way". You could also reinforce a correct move by saying, "Yes, you pressed the button and the robot moved forward!"



Getting Started

"Breakin' it Down"

Activity 1

Materials: robot, one switch (forward), CD player, favourite tunes

Set up the robot and place the switch directly in front of your child. Have your child push the switch. Model to your child that when the switch is pushed, it causes the robot to go forward. Highlight the word forward as the switch is being pushed. You may need to use the 'hand over hand' technique to demonstrate this. Once your child understands that pushing the switch makes the robot move forward, add music to play the game. When your child hears the music start to play, s/he needs to push the switch. Practice together by playing the music and pushing the switch to make the robot go

Activity 2

Materials: robot, one switch (forward)

Set up the robot and place the switch directly in front of your child. Have your child push the switch. Model to your child that when the switch is pushed, it causes the robot to go forward. Highlight the word forward as the switch is being pushed. You may need to use the 'hand over hand' technique to demonstrate this. Once your child understands that pushing the switch makes the robot move forward, add the phrase, "1, 2, 3, GO!" to play the game. Your child will listen to you as you count "1, 2, 3", and when s/he hears, "GO!" s/he needs to push the switch to make the robot move!

Activity 3

Additional Picture #1

Materials: robot, one switch (forward), toy tree (use green cylinders to represent trees)

Set up the robot and place the switch directly in front of your child. Have your child push the switch. Model to your child that when the switch is pushed, it causes the robot to go forward. Highlight the word forward as the switch is being pushed. You may need to use the 'hand over hand' technique to demonstrate this. Once your child understands that pushing the switch makes the robot move forward, place the toy tree about 30 centimetres away, directly in front of the robot. Show your child that when s/he pushes the switch and makes the robot go forward, the robot will drive to the tree and knock it down. Once your child understands this, add the phrase, "Chop, Chop, Timber!" to play the game. Your child will listen to the phrase and when s/he hears "Timber", s/he needs to push the switch to make the robot go and knock down the tree.



"Breakin' it Down"

In this activity, your child will push the switch in front of him/her to make the robot go forward and knock down a pyramid of blocks.

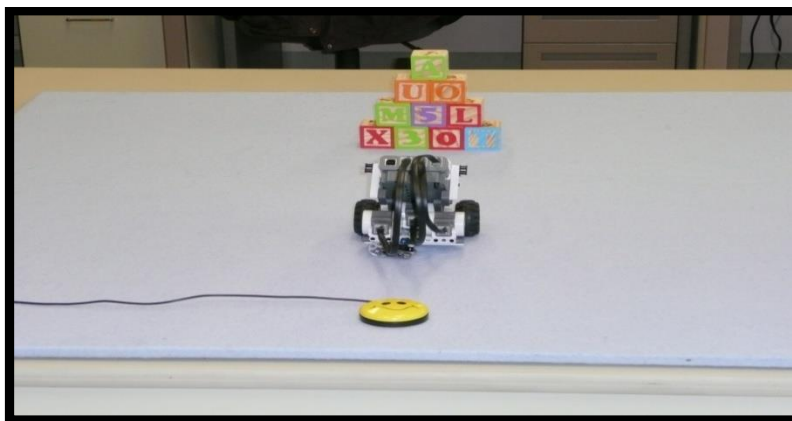
Materials Needed:

- robot and one switch (forward)
- blocks (10) stacked like a pyramid

Learning Objectives:

In this activity, your child will learn:

- the concept of cause and effect
- the concept of indirectly knocking down/moving objects using a robot
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Place the robot in front of your child so that it is facing away from him/her.
2. Set up a pile of blocks (stacked like a pyramid) directly in front of the robot, about 30 centimetres away.
3. Place the forward switch in front of your child. Highlight that this is the switch that makes the robot go forward when it is pushed.
4. Tell your child that s/he needs to make the robot go forward to the tower of blocks at the other end of the course to knock it down.
5. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.



Extension Activities:

1. Use the robot to play a game that focuses on rhyming skills. Say to your child, "In order to make your robot go forward, you need to listen for words that rhyme. If the two words I say rhyme, make your robot go! If the two words don't rhyme, your robot does not get to go. Listen carefully!"
Example: Pot/Dot rhyme so your child would press the switch to make the robot go. Pot/Black do not rhyme so your child would not make the robot go.
2. Practice your child's weekly spelling list words using the robot. Write the target spelling words on different strips of paper (i.e. flash cards). Make sure to put in some words that are misspelled. Tell your child you are going to see how well s/he knows how to spell his/her words for the week by playing a game. If the word is spelled correctly, tell your child s/he needs to press the switch to make the robot go forward, but if the word is spelled incorrectly, your child should not press the switch to make the robot go.
3. In this fun and interactive story activity, you can find out about your child's level of understanding and memory for details. Read a story with your child. Tell your child that you are going to say some sentences that are 'facts' about the story. If the sentence you say about the story is true your child should make the robot go forward but if the sentence you say about the story is not true, your child should not make the robot go. Some examples of topics you could discuss are, the main character's name, where the story took place, what the story was about, the problem in the story, how the problem was solved in the story, etc.

Make these games fun and motivating for your child by using topics they are already learning in their lives!

Real World Application

You can adapt this activity in order to give your child a means to communicate his/her preferences in a number of different areas. For example, you can present your child with questions and have him/her indicate his/her selection by making the robot go forward or not making the robot go forward. Make the activities as meaningful and functional as you can for your child.

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Follow the Colour Brick Road"

Activity 1

Materials: robot, one switch (forward), CD player, favourite tunes

Set up the robot and have your child start to drive the robot forward by pushing the switch. Explain and model to your child that you will be playing music while the robot is moving forward. When your child hears the music stop, s/he needs to release the switch, making the robot stop. Emphasize that to stop the robot, the switch has to be released. Practice together by playing the music and stopping the robot when the music stops.

Activity 2

Additional Picture #2

Materials: robot, one switch (forward), toy quad

Set up the robot and have your child start to drive the robot forward by pushing the switch. Explain to your child that you will be driving a car (the toy car) around while s/he is driving his/her robot. Tell your child that you will be playing "Follow the Leader". First, the play partner will be the leader. Drive your car alongside your child's robot and tell him/her that when you stop your car s/he must stop his/her robot too. Take a few turns being the leader and see if your child can stop his/her robot as soon as you do. Next, switch roles so that your child is now the leader. Your child will drive his/her robot and will stop randomly and you will be expected to stop your car as well. Your child can be the judge of whether you have stopped fast enough!

Activity 3

Materials: robot, one switch (forward), child's favourite toy (e.g., pony)

Place your child's favourite toy in the middle of the play area. Explain to your child that his/her job is to drive the robot to the toy, stopping the robot just before so that you can pick up the toy and place it on the robot. Then have your child drive the robot to the end of the play area, where you will be waiting to pick up the toy to give to your child. Try this activity with your child, modeling as necessary. Then have your child do it on his/her own. Change it up by using different toys during the activity.



“Follow the Colour Brick Road”

In this activity, your child will drive the robot along a colour brick road in order to match a colour swatch to a coloured brick.

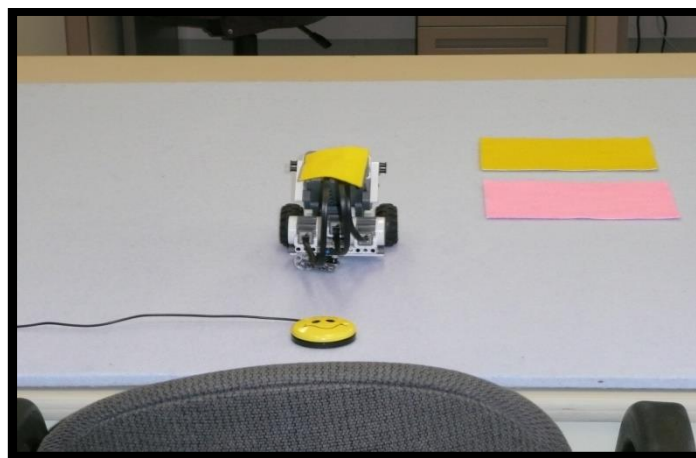
Materials Needed:

- robot and one switch (forward)
- 8 $\frac{1}{2}$ x 11 sheets of coloured felt (bricks)
- small felt colour swatches

Learning Objectives:

In this activity, your child will learn:

- the concept of identifying colours (both visual and verbal)
- the concept of matching colors
- to follow verbal commands
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Place the robot and the forward switch in front of your child.
2. Place two coloured 'bricks' (pieces of felt) in a vertical line on the far side of the play area (to make the colour brick road).
3. Place a colour swatch on the robot. Make sure that the swatch matches one of the coloured bricks placed on the table.
4. Tell your child that s/he must match the colour swatch on the robot to the same coloured brick on the table. Encourage your child to drive the robot alongside the colour brick road and stop the robot when it is lined up with the matching colour.
5. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.
6. Once your child has the hang of it, change colour swatches to repeat the task.



Extension Activities:

1. As a way of working on colour words with your child, increase the number of bricks on the colour brick road. Start with three and work your way up adding more as your child is able. Emphasize the colour words as your child engages in this activity encourage language development (colour vocabulary) and colour recognition (i.e., matching colours).
2. Take the colour swatch off of the robot and give your child a verbal instruction only. For example, "Drive your robot to the *blue* brick". This activity will encourage your child to recognize the word and be able to identify the colour without matching it to a visual cue (colour swatch).
3. Flip the brick over to the side with the white background and written names of the colours only. You can then place a colour swatch on the robot and have the child drive the robot to match the swatch with the colour word. Then, further this activity by only giving a verbal instruction such as, "Move to the brick that says 'pink'" without using the colour swatch.

Real World Application

You can adapt this activity in order to give your child a means to communicate his/her preferences. For example, you can present your child with a selection of different materials such as pictures of his/her favourite restaurants, DVD/CDs, or snacks in a line. Your child can drive the robot to his/her selection to indicate the choice s/he wants to make. Make sure that you follow through and implement the selection in real life (e.g., playing the DVD chosen).

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Pick-Up"

Activity 1

Materials: robot, two switches (forward and backward)

Begin with the backward and forward switches to practice moving the robot in two different directions. Show your child that when the forward switch is pushed, it moves the robot forward. Make sure you emphasize the word *forward* while the robot is moving. Let your child try pushing the switch while watching the robot move forward.

Next, show your child that when the backward switch is pushed, it moves the robot backward. Make sure you emphasize the word *backward* while the robot is moving. Let your child push the switch, while watching the robot move backward.

Activity 2

Materials: robot, two switches (forward and backward)

Begin with the backward and forward switches to practice moving the robot in two different directions. Show your child that when the forward switch is pushed, it moves the robot forward. Make sure you emphasize the word *forward* while the robot is moving. Let your child try pushing the switch while watching the robot move forward.

Next, show your child that when the backward switch is pushed, it moves the robot backward. Make sure you emphasize the word *backward* while the robot is moving. Let your child push the switch, while watching the robot move backward.

Once you think your child understands the concepts of forward/backward, let him/her or her know you are going to play "Simon Says." Explain and model to your child that when the instruction of, "Simon says, move forward" is said, your child needs to push the forward switch to move the robot forward. When the instruction of, "Simon says, move backward" is said, your child needs to push the backward switch to move the robot backward. Finally, when the instruction of, "Simon says, Stop" is said, your child needs lift his or her hand off the switch to make the robot stop.

Remember to explain and model to your child that he or she can only change directions or stop the robot when Simon says to!



"Pick-Up"

In this activity, your child will push a switch to make the robot go forward to pick up a favourite toy placed across from your child. Once the toy has been 'picked up', s/he will push a different switch to make the robot drive backwards in order to retrieve the toy.

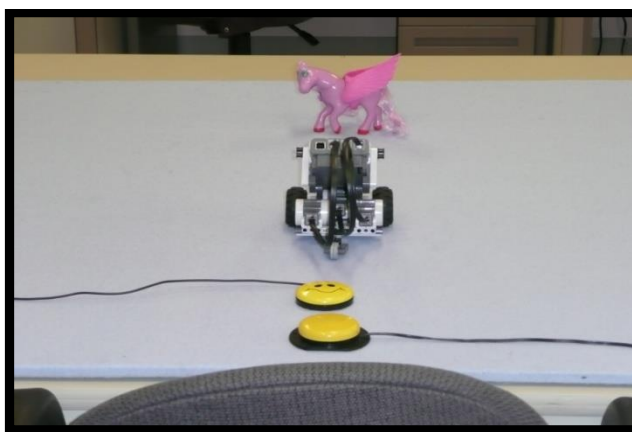
Materials Needed:

- robot and two switches (forward and backward)
- child's favourite toy (e.g., pony or car)

Learning Objectives:

In this activity, your child will learn:

- the concept of forward/backward
- the idea of using the robot to retrieve objects
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Place the robot and the forward and backward switch in front of your child.
2. Place your child's favourite toy directly in front of the robot on the other side of the play area, about 30 centimetres apart.
3. Explain to your child that s/he needs to drive the robot forward using the forward switch and stop at the toy to pick it up.
4. Once the robot is stopped at the toy, place it on the robot.
5. Explain to your child that s/he needs to drive the robot back using the backward switch.
6. Once the robot has returned to your child, take the toy off and give it to him/her to play with.
7. Change the toys to repeat the task.
8. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.



Extension Activities:

Additional Picture #3

1. Using the alphabet blocks, place three blocks in front to the left of the robot to spell a word. For example, "CAT". Then, take two different blocks (e.g., the letters "O" & "U") and place them about 30 centimetres away from the robot. Explain to your child that his/her job is to pick one of the alphabet blocks to change the word to "CUT". Switch up the activity by increasing the word length and/or increasing the number of alphabet blocks to choose from.

Additional Picture #4

2. Using the blocks, make two words. For example, make the words "FUN" & "DOG". Place the robot in between the two sets of blocks so that one word is directly in front of the robot (about 30 centimetres away), and the other word is directly behind the robot, (about 30 centimetres away). Explain to your child that s/he needs to either move the robot forward/backward to choose a word. For example, tell your child, "Drive your robot to the word that rhymes with 'BUN'". Switch up the activity by increasing the difficulty of words.

Real World Application

You can adapt this activity in order to give your child a means to communicate his/her preferences. For example, you can present your child with a question that requires a yes or no response. Write the word 'yes' on a piece of paper and the word 'no' on another piece of paper. Position the robot in the middle of the two pieces of paper. Your child will have to drive the robot forward to indicate 'yes' or backward to indicate 'no'.

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Knock Down"

Activity 1

Materials: robot, two switches (left and right), felt eyes (placed on the front of the robot for "looking"), two toys

Set up the robot in the middle of the two toys. Place the left and right switches in front of your child. Show your child that when the left switch is pushed, it turns the robot to the left (the robot is looking to the left). Make sure you emphasize the word left while the robot is turning and that the robot is looking at the toy. Let your child try pushing the switch, while watching the robot turn to the left to look at the toy.

Next, show your child that when the right switch is pushed it turns the robot to the right (the robot is looking to the right). Make sure you emphasize the word right while the robot is turning and that the robot is looking at the toy. Let your child push the switch while watching the robot turn to the right to look at the toy.

Once you think your child understands the concepts of left/right, play a game where you call out either "left" or "right" and your child moves the robot in the direction you called.

Activity 2

Materials: robot, two switches (left and right), eyes (placed on the front of the robot for "looking"), two toys (e.g., car and toy quad)

Set up the robot in the middle of the two toys. Place the left and right switches in front of your child. Show your child that when the left switch is pushed, it turns the robot to the left (the robot is looking to the left). Make sure you emphasize the word left while the robot is turning and that the robot is looking at the toy. Let your child try pushing the switch, while watching the robot turn to the left to look at the toy.

Next, show your child that when the right switch is pushed it turns the robot to the right (the robot is looking to the right). Make sure you emphasize the word right while the robot is turning and that the robot is looking at the toy. Let your child push the switch while watching the robot turn to the right to look at the toy.

When your child can perform this task, place a toy to the left and a different toy to the right of the robot. Play a game where you call out the name of the toy the robot needs to look at. For example, if you have a toy car on one side of the robot you say, "Turn the robot to look at the car." Switch up this activity by changing the toys that the robot needs to look at.



"Knock Down"

In this activity, your child will push the left and right switches to make the robot turn to knock over a tower of blocks.

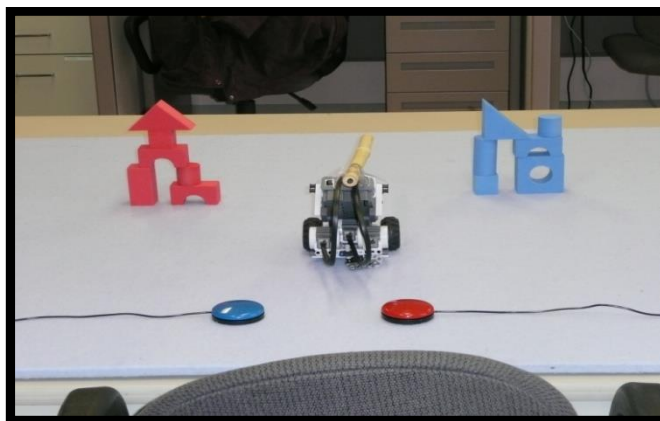
Materials Needed:

- robot and two switches (left and right)
- foam blocks
- long handle (bamboo rod)
- tape

Learning Objectives:

In this activity, your child will learn:

- the concept of moving the robot left/right.
- the idea of using the robot to retrieve objects
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Set up two towers out of the foam blocks. Have the red tower on the left, and the blue tower on the right (from your child's perspective).
2. Fasten the long handle onto the robot using tape.
3. Set up the robot in the middle of the two towers of blocks (make sure that the handle on the robot can reach both towers when turned).
4. Place the left and right switches in front of your child.
5. Show your child that when the left switch is pushed, it turns the robot to the left and the handle knocks over the red tower of blocks. Make sure you emphasize the word *left* while the robot is turning.
6. Let your child try pushing the switch, while watching the robot turn to the left to knock over the tower of blocks.
7. Now show your child that when the right switch is pushed, it turns the robot to the right and the handle knocks over the blue tower of blocks. Make sure you emphasize the word *right* while the robot is turning.
8. Let your child push the switch, while watching the robot turn to the right to knock over the tower of blocks.



9. Once you think your child understands the concepts of left and right play a game where you call out either "left" or "right" and your child moves the robot in the direction you called, to knock over the tower of blocks.
10. You can also try calling out the colour of the tower of blocks you want your child to knock over.
11. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.

Extension Activities:

1. Using two pieces of paper, write a correctly spelled word on one page and the same word spelled wrong on the other page. For example, write the words "SAID" on one piece of paper & "SED" on the other piece of paper. Place the robot in between the two pieces of paper so that one paper is directly to the left of the robot and the other paper is directly to the right of the robot. Explain to your child that his/her task is to get the robot to 'point' (using the long handle) to the word that is spelled correctly. Enhance this activity by making the spelling mistake more difficult to find (e.g., said/siad).
2. Begin reading a "choose your own adventure" book to your child. When you get to a point where the character has to make a decision between two choices, write down the choices on two pieces of paper. Next, place the robot in between the two papers and tell your child that s/he gets to decide what the character will choose. Explain to your child that s/he needs to turn the robot to look at the choice the character should make. Continue providing your child choices as the story progresses.

Real World Application

You can adapt this activity in order to give your child a means to communicate his/her preferences. For example, you can present your child with two different snack choices (one to the left of the robot and one to the right of the robot). Your child can turn the robot to the snack choice s/he wants to eat. Make sure that you follow through and implement the selection in real life (e.g., allowing your child to eat the snack s/he chose).

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Go Fetch"

Activity 1

Additional Picture #5

Materials: robot, four switches (forward, backward, left, and right), tower of blocks

Set up the robot in front of your child and place the tower 30 centimetres away at a diagonal to the right of the robot. Explain and model to your child that s/he needs to push the different switches in the right sequence, in order to drive the robot to the tower. Your child will first drive the robot straight (using the forward switch), then when the robot is aligned with the tower s/he will turn the robot (pushing the right switch), and finally drive the robot straight again (using the forward switch). Pushing these switches in the correct order will allow your child to knock down the tower.

Then, your child needs to drive the robot back to him/her. Explain and model to your child that s/he needs to sequence pushing the switches to turn the robot around and drive it back to him/her. After a few assisted practice trials, have your child perform the activity independently. After your child can move the robot independently to the object, place the tower on the opposite side to practice using the left switch.

Activity 2

Additional Picture #6

Materials: robot, four switches (forward, backward, left, and right), favourite toy (e.g., tiger)

Set up the robot in front of your child and place the toy 30 centimetres away at a diagonal to the right of the robot. Explain and model to your child that s/he needs to push the different switches in the right sequence in order to complete this task. Your child will first drive the robot straight (using the forward switch), then when the robot is aligned with the toy s/he will turn the robot (pushing the right switch) and finally, drive the robot straight again (using the forward switch) to pick up the toy. Once the robot has reached the toy, pick it up and place it on the robot.

Then, your child needs to drive the robot back to him/her. Explain and model to your child that s/he needs to sequence pushing the switches to turn the robot around and drive it back to him/her. After a few assisted practice trials, have your child perform the activity independently. After your child can move the robot independently to the object, place the object on the opposite side so s/he can practice using the left switch.



"Go Fetch!"

In this activity, your child will push different switches in a variety of sequences to drive the robot to different objects.

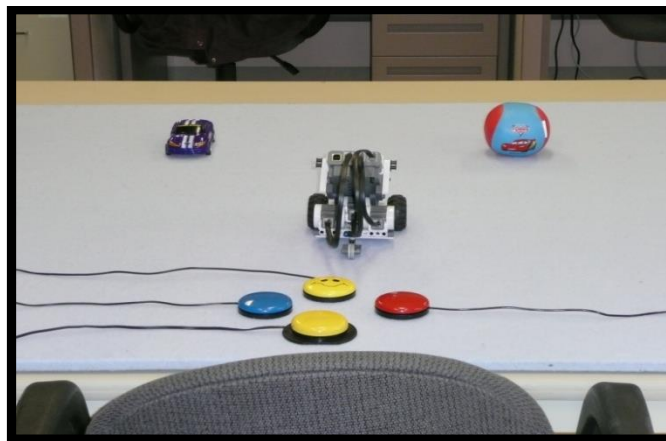
Materials Needed:

- robot and four switches (forward, backward, left and right)
- toys (e.g., ball, toy car)

Learning Objectives:

In this activity, your child will learn:

- to follow verbal commands
- to sequence pushing different buttons to navigate the robot to an object
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Set up the robot and all four switches (forward/backward/left/right) in front of your child.
2. Place two objects about 30 centimetres away from the robot at a diagonal, one to the left and one to the right of the robot.
3. Explain to your child that s/he needs to drive the robot to the object you call out. For example, have a ball and a toy car as objects in the activity. Tell your child, "Drive to the ball." Your child then needs to drive the robot to the ball.
4. Switch up the activity by using different objects and calling out different names for each turn.
5. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.



Extension Activities:

1. Increase the number of objects/toys your child has to choose from. Start with three and work your way up by adding more as your child is able.
2. Instead of labelling the object you want your child to drive to, say the first sound that the object starts with instead. For example, if you want your child to drive to the ball say, "Drive the robot to the toy that starts with a B."
3. Describe the object without directly saying the label. This will help your child identify attributes of objects. For example, if you want your child to drive to the toy dog, say, "Drive to the toy that has four legs."
4. Practice the concept of rhyming by coming up with a word that rhymes with the object you want your child to drive to. For example, if you want your child to drive to the ball, say, "Drive to the toy that rhymes with doll."

Real World Application

You can adapt this activity in order to give your child a means to communicate his/her preferences. For example, you can present your child with a question and then have a selection of different materials which your child can choose from to indicate his/her answer. Some example questions include: "What do you want for supper tonight?" "Which game should we play?" "What order should we do these activities in?" Your child can drive the robot to his/her selection to indicate his/her choice. Make sure that you follow through and implement his/her selection in real life (e.g., Do the activities in the order that s/he chose).

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Shop 'Til You Drop"

Activity 1

[Additional Picture #7](#)

Materials: robot, four switches (forward, backward, left, and right), toy princesses

Set up the robot and place the toy princesses around the play area. Tell your child that the princesses need to be picked up and taken back to their castle. Have your child drive the robot to each princess, one at a time. When your child stops at a princess, place the princess on the robot, and have your child drop it off at the castle.

Activity 2

[Additional Picture #8](#)

Materials: robot, four switches (forward, backward, left, and right), toy garbage cans

Set up the robot and place the toy garbage cans around the play area. Tell your child that s/he is the garbage collector and that the garbage cans need to be picked up from every house in the neighbourhood. Have your child drive the robot to each garbage can, one at a time. When your child stops at a can, place the can on the robot, and have your child drop it off at the "landfill" (off to the side).

Activity 3

[Additional Picture #9](#)

Materials: robot, four switches (forward, backward, left, and right), zoo animals, toy food (foam blocks or toy food)

Set up the robot and place the zoo animals around the play area. Tell your child that s/he is the zookeeper and that all the zoo animals need to be fed. Have your child drive the robot to each animal, one at a time. When your child stops at an animal, help your child by placing food in front of the animal. When every animal has been fed, have your child drive back to each animal to pick up their leftovers.



“Shop ‘Til You Drop”

In this activity, your child will drive the robot along the grocery store play area and chose groceries that will be placed into his/her grocery basket.

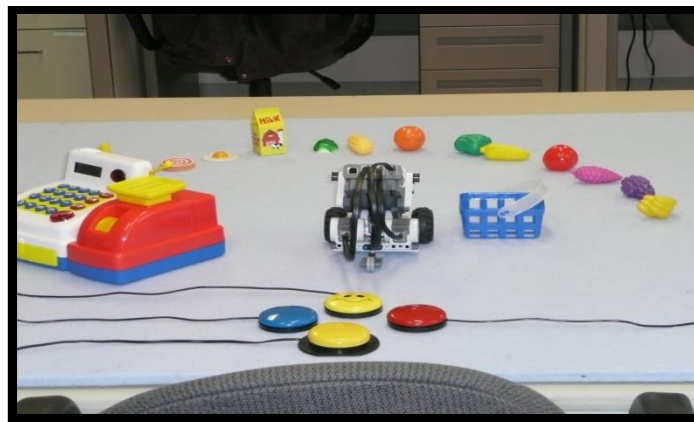
Materials Needed:

- robot and four switches (forward, backward, left and right)
- grocery items; these can be toys or actual food items (vegetables, fruit, cereal, milk, etc)
- basket
- toy cash register and toy money

Learning Objectives:

In this activity, your child will learn:

- symbolic/imaginative play with a play partner
- to indicate choices/preferences
- social interaction
- life skills (buying groceries)
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Place the grocery items along the edge of the play area.
2. Place the robot and all four switches in front of your child.
3. Place the shopping basket to the right of the robot.
4. Explain to your child that you are going grocery shopping and s/he will need to choose grocery items to go in the basket.
5. Have your child drive to each item that s/he wants, one at a time. When the robot stops at an item, place the item in the basket, and let your child continue shopping.
6. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.



Extension Activities:

1. Give your child money (play money) to pay for the groceries. You will pretend to be the cashier. Pretend to scan the grocery items, and give your child change when complete. Throughout this activity, focus on using lots of language. Ask your child things like, "How many bags would you like?" "Do you have any coupons?" Your child can answer these questions by using any form of communication such as talking mats, AAC device, yes/no board, or speech.
2. Give your child 2-3 choices on what s/he would like to cook for supper with you. Example, "Do you want to make pizza or spaghetti?" With your child, decide what ingredients you will need. Make a grocery list of things you will pick up. Explain to your child that s/he needs to pick up every item on the list, and then drive the robot to the checkout. Once the groceries are purchased, pretend to cook supper together with all the ingredients.
3. Talk to your child about the food groups (i.e., grain, vegetables and fruit, milk and milk products and meat). Place different foods around the play area and have your child learn to put these items into different categories. Example, "I want you to find all the foods that would fit into the fruits and vegetables group".

Real World Application

Grocery shopping is a practical activity for any family. Many children like to be involved when Mom and Dad go shopping. "Shop Til You Drop" can easily be transferred to creating a shopping list together. In order to write a list together, you can place different foods on the table. Your child can direct the robot towards the foods they would like you to buy when you go to the grocery store. This allows your child to have choices, and to let you know what types of foods s/he would like to eat.

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



Getting Started

"Picking Up the Pieces"

Activity 1

Additional Picture #10

Materials: robot, four switches (forward, backward, left, and right), shape puzzle and matching shape pieces

Set up the robot and place the shape outline on the play area. Scramble the shape cut-outs around the play area and tell your child to look at the shapes and match them up with the outline. You can either have the child move the shape directly onto the outline or drive the robot right beside it and assist your child by putting it together.

Activity 2

Additional Picture #11

Materials: robot, four switches (forward, backward, left, and right), river (blue felt piece), bridge (foam bridge blocks), toy person

Set up the robot and position the blue felt (river) across the play area. Place a toy person on the other side of the river. Put the bridge and other bridge pieces a short distance away from the person. Tell your child they need to help the person cross the river by selecting bridge pieces and push them over to the river with the robot to make a complete bridge. You can make this activity easier by having only one piece which your child must push over to the river. Move the toy person over the bridge for your child to see that s/he has solved the problem.

Activity 3

Additional Picture #12

Materials: robot, four switches (forward, backward, left, and right), coloured foam blocks

Set up the robot and place a set of coloured blocks on the play area. This set of blocks should make a pattern (e.g., blue, green, red, purple, blue, green, red, purple). Tell your child that you have made a pattern. Have your child identify the pattern by choosing which coloured block would go next. To increase difficulty, include more coloured blocks in the pattern.



"Picking Up the Pieces"

In this activity, your child will use problem solving skills to solve a puzzle with the robot.

Materials Needed:

- robot and four switches (forward, backward, left, and right)
- puzzle (e.g., Disney Princess or Cars puzzle)

Learning Objectives:

In this activity, your child will learn:

- multi-step problem solving skills
- two objects can go together
- creative thinking
- to indicate preferences and give feedback on how s/he viewed the activity (enjoyable/not enjoyable)



Instructions:

1. Set up the robot and all four switches. Assemble the puzzle, leaving ten pieces out.
2. Set up the play area with the partially assembled puzzle in view of the child.
3. Put the remaining ten puzzle pieces randomly on the play area.
4. Point to a space on the puzzle that has a missing piece. Ask your child to find the missing piece. When your child has stopped the robot by a puzzle piece, you will then place this piece on the robot and have your child drive it back to the puzzle. Depending on your child's level of hand-eye coordination, you may place the puzzle piece in the puzzle for your child, or s/he can try it on his/her own.
5. If your child tries an incorrect puzzle piece, have him/her drive the robot to another location of the puzzle and try again.
6. If your child is having difficulty with this activity, use the strategies suggested in the cueing hierarchy (pg. 12-13). Provide the necessary supports to your child for him/her to be successful.
7. As your child gets better at this activity, more pieces can be missing from the puzzle.



Extension Activities:

Additional Picture #13

1. Using the alphabet blocks, take the letters of a word and scramble them up! Explain to your child that s/he needs to unscramble the blocks to make the word. For example, place the letters W-O-R-L-D in a mixed up order and have your child use problem solving skills to spell the word.

Additional Picture #14

2. Using the math blocks, make an equation for your child to solve, leaving out the answer (e.g., $3+1=$ ___). Then place possible answers around the play area. Your child will drive the robot to the correct answer.

Real World Application

You can adapt this activity in order to encourage your child to problem solve in everyday situations. An example of an activity where your child will have to solve a problem is creating a "tempting scenario" where the item s/he wants is visible but out of reach. Prompt your child to use the robot to get what s/he wants. When you see that your child is attempting to problem solve with the robot, let him/her know you have recognized the attempt, and give your child the item s/he wants. For example, your child might see a toy that is behind another object. S/he could use the robot to move the other object out of the way, or to attempt to reach the toy in some way. You should reinforce this behaviour by giving your child the toy.

Reflection: Using Talking Mats

After this activity, we encourage you to ask your child how s/he feels about the activity. Questions include, "Did you think this activity was fun?", "Would you want to play this activity again?", "Would you like to play a different activity?", and/or make up your own questions as you see fit!



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