



# **Report on the *Wings of Discovery*™ Baseline Data Survey and Project Evaluation**



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## Evaluation of the *Wings of Discovery*<sup>TM</sup> Program

### Overview:

*Wings of Discovery*<sup>TM</sup> is a comprehensive curriculum-based program that encourages children to explore, learn and apply basic mathematics, science and technology concepts in daily activities. The Butterfly Learning Centre (BLC) staff has used this program, since September 2002, with all children to foster the development of critical life skills, core science knowledge and a positive attitude about science in young children. *Let's Talk Science* designed the *Wings of Discovery*<sup>TM</sup> program to actively enhance young children's current learning, their readiness for school and to improve their long-term learning and development.

*Let's Talk Science* is also committed to the development, delivery and evaluation of quality Science<sup>1</sup> programs, resource materials and delivery methods that are based on research conducted by scientists and educators, using sound pedagogical teaching and learning approaches. To evaluate the effectiveness of the *Wings of Discovery*<sup>TM</sup> program during its first phase, *Let's Talk Science* formulated questionnaires to gather information regarding Science and Science education activities from parents who have children in the preschool classes at the Butterfly Learning Centre. Teachers at the BLC also completed questionnaires concerning their attitudes towards Science and their confidence in their ability to teach Science. To evaluate each individual *Wings of Discovery*<sup>TM</sup> project, children at the BLC were questioned before and after each project to determine if there was any increase in core Science knowledge. A letter was sent to all parents, prior to any questioning of children, describing the *Wings of Discovery*<sup>TM</sup> program and the evaluation process. Parents were also asked to provide written consent for their child(ren) to participate in both the program and the evaluation process.

### Our Partners:

*Let's Talk Science* wishes to acknowledge the continuing generous support of DuPont Canada, our founding supporter, and Imperial Oil. Their commitment to improving Science literacy has provided the foundation for our work at *Let's Talk Science*. Support from The Lawson Foundation, The Ontario Trillium Foundation and the Ontario Ministry of Community, Family and Social Services: Early Years Challenge Fund has allowed us to devote considerable time and resources over a number of years to preparation, design, testing, writing and impact research of *Wings of Discovery*<sup>TM</sup>.

In partnership with the Butterfly Learning Centre and the Waterloo Region District School Board, we work hand in hand with early childhood educators, administrators, program leaders, kindergarten teachers and the children in their care on the development and real-life testing of *Wings of Discovery*<sup>TM</sup>. ABC Springbank Child Care Centre, Huron Heights Early Childhood Learning Centre and Chippewa of the Thames First Nations Daycare also opened their doors for us to test and demonstrate *Wings of Discovery*<sup>TM</sup>.

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<sup>1</sup> Our Science includes life and physical sciences, technology, engineering and mathematics.

## **Results from Baseline Data Collection**

Baseline measurements were obtained through surveying parents, teachers and children prior to the start of the *Wings of Discovery*<sup>TM</sup> program at the Butterfly Learning Centre (BLC) in August 2002. The same surveys were repeated in August 2003 following the first year of implementation to find out if any change in attitude and interest towards Science had occurred following implementation of the *Wings of Discovery*<sup>TM</sup> program.

### **(1) Parent Survey:**

The survey consisted of a four-page questionnaire on Science and Science education, based on a previous survey used by Let's Talk Science (1995) for a Montessori research project. The survey was sent out to all parents of children at BLC with the return requested in two weeks. A sealed envelope was provided for each parent's reply.

- Return** 25/55 surveys returned (46%) for pre-test, 10/55 surveys returned (18%) for post-test.
- Education** 60% of mothers and 44% of fathers had an education at the university-bachelor level or above with 88% mothers and 72% fathers having some form of post-secondary education. This question also had a high "no response" rate from fathers (24%).
- 40% mothers and 32% fathers have a science background at the undergraduate degree level and above.
- 36% mothers and 32% fathers have a science background at the high school level only. This question also had a high "no response/don't know" response rate (16% mothers, 28% fathers) suggesting that this group did not have a high formal education background in science.
- Income** 44% of parents have a family income of \$100,000+ which is consistent with the education findings.
- 12% of parents had a family income below \$39,000 per year.
- Occupation** Mothers were found to have occupations predominantly in office/clerical (20%), hospital/medical/social services (16%) and business/managerial (16%).
- Fathers were found to have occupations predominantly in business/managerial (32%) and computer information systems (16%). This question also received a high "no response" rate (24%) from fathers.

The female caregiver generally completed the forms, which may be the reason for the high "no response" rate attributed to fathers. The father may not have been present when the form was completed and the mother was unaware of education, science background or correct classification of job for the father.

### **Importance of Science**

All respondents, in both pre- and post-tests, agreed that it was important to learn Science. In the pre-test the majority of parents (52%) thought that a child should learn Science between the ages of 2 and 4 years, while another large segment (20%) believed that Science should begin at less than 1 year old. The post-test showed a slight shift towards starting Science at a younger age with 40% still favouring the 2-4 age group and 30% now favouring less than 1 year old. This question also had a high "no response/don't know" rate of 16% (pre-test) and 20% (post-test).

School readiness, or ability to do well in science in elementary school, was often put forward as a reason for starting science in the early years.

### **Educational activities with children**

The pre and post-test results for questions concerning educational activities showed little change. Over half the respondents (52%) had never, or rarely, visited a science centre or museum with their children. The remaining respondents visited such centres one or more times per year. The zoo was popular with parents with 76% of respondents visiting a zoo at least once per year.

Television shows seemed to be the favoured method of sharing Science with young children with 60% of respondents watching shows at least once per month. Approximately 12% watched Science shows several times each week.

Science “experiments” or Science games (computer/board games) were rare occurrences with 40% of the respondents but 36-40% did experiment or play games at least once per month. However, math skills are evidently a top priority given that 92% of respondents reported practicing counting with their child several times per week.

Most parents (80%) constructed things with their children several times per week and more than half (52%) walked through nature areas several times per week with their child.

### **Interest in Science**

Before the *Wings of Discovery*<sup>™</sup> program at BLC, only 8% of parents reported their children as mentioning any form of Science and only 4% of parents had actually seen any artefact from Science activities. At the end of the first year of the program, 60% of parents reported their child as talking about the Science activities they did in school and 40% of parents indicated that their child showed them what they did.

### **Parental involvement**

More than half the parents surveyed (52%) indicated that they wished to be very involved in the Science activities of their child at BLC while an additional 44% responded they would like to be “somewhat involved”.

In the pre-test, when asked to clarify the type of involvement, parents listed the following items, in order of preference.

- 1- Collect items for use in Science
- 2- Talk about Science brought home
- 3- Do an activity for home
- 4- Help with field trips
- 5- Volunteer in rooms
- 6- Suggest an activity to educator
- 7- Organize guest speakers

In the post-test the order of preference shifted slightly.

- 1- Talk about Science brought home
- 2- Do an activity for home
- 3- Collect items for use in Science
- 4- Help with field trips
- 5- Volunteer in rooms
- 6- Suggest an activity to educator
- 7- Organize guest speakers

## (2) Teacher Survey:

In addition to collecting background information, the teachers survey dealt with attitudes towards Science and confidence in their ability to teach Science. The questionnaire used was based on the Teaching Efficacy Belief (STEB) instrument developed by Riggs and Enoch (1990). The questionnaire was initially given to teachers in August 2002 with return requested in two weeks.

### Return

All 16 questionnaires (100%) were returned for the pre-test and 11/16 (69%) were returned for the post-test.

### Demographics

Teachers at the Butterfly Learning Centre are generally between the ages of 21 and 30 (67%) and, at the time of assessment, all teachers were female. All had ECE qualifications or higher and some knowledge of Reggio, High Scope and theme-based programming. The level of experience was well balanced with 27% of teachers having less than 3 years, 27% having 3-7 years and 33% having 7-11 years experience in the field. One respondent had more than 17 years experience with ECE.

### Age to start Science education

During the pre-test teachers were more or less divided on the age to begin Science education with 40% favouring 2-4 years old and 40% favouring less than 2 years. After a year of Wings programming a higher percentage of teachers now thought that Science education should begin at 2 years and under (64%).

### Confidence and ability to teach Science

Although most of the teachers at BLC initially felt confident about their ability and knowledge to teach Science effectively all seemed to benefit from implementation of the *Wings of Discovery*<sup>TM</sup> program and exposure to more Science.

During the pre-test 73% of teachers felt confident about teaching Science, whereas, during the post-test 82% now felt confident.

A similar growth was seen in the welcoming of children's questions. Before the *Wings of Discovery*<sup>TM</sup> program 87% of teachers welcomed questions and felt capable of answering them (87%). At the end of a year of programming 100% of the teachers who responded welcomed questions and felt capable of answering them (91%).

### Attitude towards science

The *Wings of Discovery*<sup>TM</sup> program also seemed to have an effect on the teachers' attitudes towards Science. Initially, 67% teachers agreed that they really enjoyed teaching Science while at the end of the first year of programming 82% of teachers really liked teaching Science.

## (3) Children's Survey:

The purpose of the baseline data collection was to determine if children of this age understood the term Science and to discover their attitude towards Science.

The pre-test was administered to all children in the preschool classes in August 2002 but it was observed that children below the age of 3 had difficulty comprehending and responding to the questions. For this reason only children who were at least 2 years 11 months in August 2002 were used to gather baseline data. Of the original 31 subjects, only 9 remained at the end of the first year that also met the age requirement.

The first question "**What is Science?**" required an open-ended verbal response.

During the pre-test only one child provided an explanation of science (*It's Ontario Place*) and the rest responded that they didn't know. In the post-test, following a year of activities, 7 (78%) children now described Science in relation to what they were doing, or had done, in the classroom. Science is:

- about plants, they don't grow in the dark
- -circle (time)
- when you do potions
- When we do (an) activity
- learning stuff

The children's understanding of Science was explored further though the selection of pictures as a method of responding to a specific question. Children were first asked to describe the pictures to ensure the subject was understood. If they didn't understand, the picture was explained by the researcher. To ensure that children understood the process a simple question, unrelated to Science was first asked. Each child was shown the following picture series and asked to "Show me the kids". Seven out of the nine children tested selected the correct picture in response to the question.



### Who is doing Science?

The group of pictures shown on the right were shown to individual children one set at a time. For each set, children were asked to "Show me who is doing Science." Children were encouraged to select as many pictures as they thought relevant to the question. During the pre-testing, some children made no response at all and stated that there was "no one was doing Science".

### Responses

Picture set A	Number of responses for the following pictures when asked 'Who is doing Science?'		
	Kids sleeping	Traditional scientists	Hairdresser
Pre-test	0	5	2
Post-test	1	8	0
Picture set B	Doctor	Teacher	Children doing Science
Pre-test	3	3	3
Post-test	2	6	5
Picture set C	Traditional scientist –male	Kid + magnifier	Children in playground
Pre-test	2	4	4
Post-test	9	8	1
Picture set D	Kids + microscope	Dentist	Traditional scientist - female
Pre-test	2	1	0
Post-test	5	2	6

It is interesting to note the increase in selection of pictures showing children with scientific apparatus (magnifying glasses, microscope, glassware) during the post-test. Performance of hands-on Science activities seems to reinforce the idea that they, the children, are doing Science. Pictures illustrating typical scientists were also selected more frequently in the post-test than pre-test. Doctors and dentists were not perceived as "doing Science" by many of the children.

Another interesting point was the selection of the teacher, in the first set, as a person "doing Science" in the post-test by 2/3 of the children. Science activities in the *Wings of Discovery*<sup>TM</sup> program are

led by the teacher, which is probably the reason why children view the teacher as doing Science.

### Attitude towards Science

To obtain attitude data happy, no emotion and sad faces were used.



Children were first asked to describe the faces. Most of the children had no problem but some (generally the younger children) saw no difference between the happy and sad face. Often the middle face was attributed to sad.

When asked if they liked to do Science, 5/9 children showed no change in attitude between pre- and post-tests and 4/9 changed from not liking (sad face) to liking Science (happy face). During the post-test, **all children** indicated that they liked to do Science.

The question “**How do you feel about Science**” was more problematical as children of this age often have difficulty relating a feeling (happy, sad, angry) to an object or event, in this case “Science.” For this question, 3/9 children showed no change between pre- and post-test and indicated they were happy with Science. Two children changed from being sad to happy about Science, one child changed from happy in the pre-test to the middle face for the post test and one child responded with “don’t know”.

## **Evaluation of *Wings of Discovery*<sup>TM</sup> projects**

### **Overview:**

*Wings of Discovery*<sup>TM</sup> is Canada's first comprehensive Science-based program for young children, infant to 5 years and was created to help young children develop critical life skills, core knowledge and a positive attitude towards learning in Science. The early years program resources consist of eight six-week long projects, based around real-world experiences that provide a full year of classroom programming.

The launch of the Butterfly Learning Centre (BLC), along with their desire to implement a Science-based curriculum, presented Let's Talk Science with the opportunity to witness, first hand, the effect of regular and frequent, Science activities on core knowledge and interest in Science. We were unable to measure the development of life skills at this time. The Butterfly Learning Centre is an innovative child-care facility caring for 108 children from about 6 months up to 6 years of age. The centre has 21 staff and is located in Waterloo, Ontario.

To measure core knowledge of children, a series of questions were developed for each project implemented at BLC. These questions were asked before and after each individual project. When developing the questionnaire, it was realised that, although children may understand a concept and be capable of selecting a correct answer, at this age they may have difficulty in articulating their thoughts. The questionnaire was, therefore, designed to permit children to select a response from a series of pictures rather than provide a verbal answer. As with the baseline data, only children aged 2 years 11 months and up in September 2002 were used in the evaluation.

The children's attitude and interest in Science was determined primarily through questions on the parental survey, concerning discussion of Science at home, as well as comments from ECE educators.

### **Protocol:**

- A letter was sent to all parents describing the *Wings of Discovery*<sup>TM</sup> Program and requesting written consent for their child(ren) to participate in the evaluation process.
- Each child in the survey was coded so that the pre and post- project results could be compared.
- Each project evaluation consisted of presenting children with 3-4 specific questions related to the project. These questions focused on the key project concepts and were decided on in consultation with the program developers.
- Participation by children was voluntary and was on a one on one basis outside the child's classroom. The "reward" for participation was a sticker.
- Pre-testing was done during the week prior to the start of the project and post-testing was carried out 1-2 weeks after the end of the project. The exception to this was the "Trip to My Garden" project. This project was broken into four parts throughout the year. The pre-test was administered about a week prior to the Fall Garden (September, 2002) and the post-test was not carried out until after the Summer Garden (August, 2003).
- For each question, children were shown a strip of 3-4 pictures and asked to identify what was in each picture. The researcher provided the identification if the child was unclear on the content.
- Having identified the pictures, children were then asked a specific question e.g. "Show me things that need to be kept cold", "What can you use to clean up water on the floor." Children responded by pointing to one or more pictures. Children were given unlimited choice as to the number of pictures they chose.



- Children tended to select only one picture even if the question required several. The phrase “Anything else?” was used after an initial response to ensure that the child selected all possible responses.
- The same children, questions and pictures were used for both pre- and post-tests.

### Results:

Many of the responses to the questions required the selection of more than one picture and a response is considered “complete” when the child has selected **all** the pictures that are relevant and appropriate to the question. This analysis includes only the number of “complete responses” made by each child for each question. However, all children participating in the evaluation demonstrated an increase in their core knowledge of Science over the first year of implementation of the ***Wings of Discovery***<sup>™</sup> program i.e. whereas in the pre-test they selected 0 relevant pictures, in the post-test they were able to select 1 out of 2 relevant pictures. While this is not a “complete response” for the purpose of this report it did indicate an increase in understanding. Sometimes, a child’s response, although not matching the desired (or “correct”) response, was entirely logical based on their experiences. Such responses are discussed as they occur.

### Project title: Trip to the Grocery Store

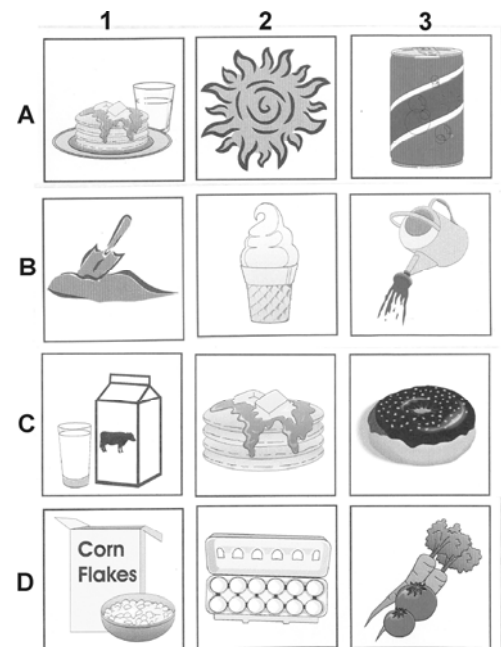
Date of pre-test August 28, 2002  
 Date of post-test October 16, 2002  
 Number of children participating = 13

### Project overview

This project introduced children to the following concepts:

- The chemical reactions that occur during cooking
- The different types of plants that we eat
- The needs of a plant
- The need for cleanliness
- The technology found in the grocery store

The mini-projects were *Food Chemistry*, *Where Does Food Come From?*, *Technology and Nutrition & Hygiene*.



## Responses

	Questions	Picture set used	Desired response-picture(s)	% participants selecting a complete response in the	
				pre-test	post-test
1	Show me what plants need to grow.	A	2	38%	69%
2	Show me what plants need to grow.	B	1,3	62%	100%
3	Show me foods that need to be kept cold.	C	1	23%	77%
4	Show me foods that need to be kept cold.	D	2,3	54%	85%

The results seem to indicate that the activities in this project had a considerable effect on the child's recognition of what plants need to grow as well as those food items that should be kept cold. Although vegetables are not always placed in a refrigerator, they are usually kept in a cool place and this fact was emphasized during the project.

### Project title: Trip to the Garden

Date of pre-test October 16, 2002

Date of post-test July 22, 2003

Number of children participating = 21

### Project overview

This project introduced children to the following concepts:

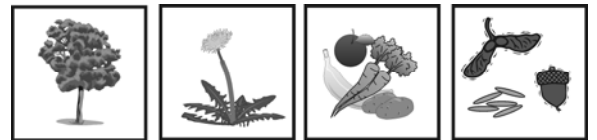
- The types and features of gardens
- The types of weather that occur in the seasons
- The needs and parts of a plant
- The types of animals which can visit gardens
- The ways in which gardens are maintained

The mini-projects were *Fall Garden*, *Winter Garden*, *Spring Garden* and *Summer Garden* and are spread throughout the year. The initial questioning was done prior to the first mini-project (Fall Garden) and the final nine months later following the end of the Summer Garden mini-project.

## Responses

### Q. Show me all the plants

The selection of all pictures would indicate a complete response for this question.



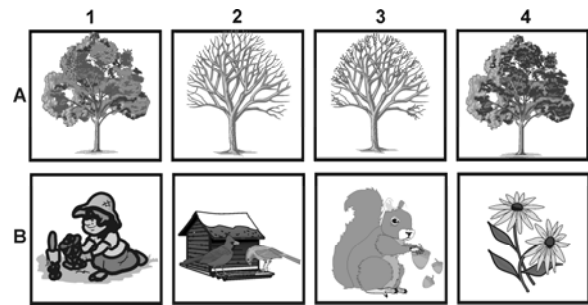
The majority of children, 90%, were able to correctly identify the dandelion as a plant in the pre-test but only 43% identified a tree and 33% identified fruit, vegetables and seeds as plants.

In the post-test more children, 62%, correctly identified a tree as a plant and dandelions were selected by 81%. However, recognition of fruit, vegetables and seeds as plants remained low with only 24% of children responding that these were plants.

“Carrots are carrots –not plants!” Comment from one of the participants.

The other two questions asked related to the characteristics of the seasons.

The activities chosen by BLC staff for this project did not include any that dealt specifically with trees throughout the seasons and this seems to be apparent in the results of the questioning. However, the results do show an increased recognition of trees in summer and winter following the activities.



Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the	
			pre-test	post-test
1 Show me which tree belongs in the spring	A	3	33%	33%
2 Show me which tree belongs in the summer	A	4	33%	52%
3 Show me which tree belongs in the fall	A	1	52%	43%
4 Show me which tree belongs in the winter	A	2	57%	71%

Activities represented by the pictures in set B were more closely aligned to the actual activities performed by the children. The results obtained for this question demonstrate the effect of the Wings programming on the core knowledge of the children.

Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the	
			pre-test	post-test
1 Show me which picture belongs in the spring	B	1	29%	48%
2 Show me which picture belongs in the summer	B	4	29%	43%
3 Show me which picture belongs in the fall	B	3	33%	62%
4 Show me which picture belongs in the winter	B	2	43%	71%

Two children made different selections for spring and although considered as “incorrect” here they were, in fact, good choices and demonstrate the effect their own experiences have on learning. One child selected flowers for the spring because *“flowers are still in the spring”*, while another selected the birdfeeder because *“I see birds in the spring”*.

### Project title: Trip to My Home

Date of pre-test November 5, 2002

Date of post-test January 7, 2003

Number of children participating = 19

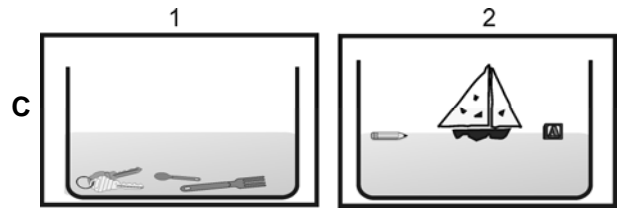
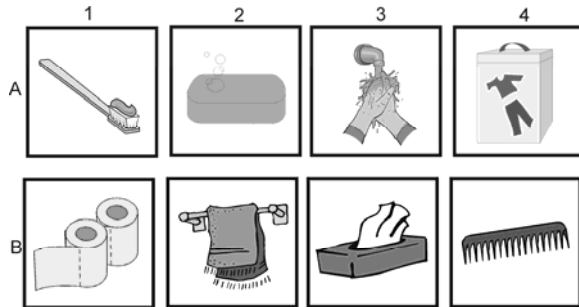
**Project overview**

This project introduced children to the following concepts:

- The importance of shelter to people
- The role of technology in the home
- The properties of household liquids and how they keep people clean
- The sources of light and sound in the home

The mini-projects were *Kitchen, Bathroom, Basement, Living Room, Bedroom, Structures & Materials.*

**Responses**



Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the pre-test	% participants selecting a complete response in the post-test
1 Show me what you use to keep yourself clean.	A	1,2,3	26%	53%
2 If there was water on the floor, what could you use to clean it up?	B	1,2,3	5%	79%
3 Which picture shows things that float?	C	2	74%	84%
4 Which picture shows things that sink?	C	1	79%	89%

The results show that most of the children had a good understanding of floating and sinking before the **Wings of Discovery™** activities but that performing the activities did help some children to gain an understanding that they did not previously have.

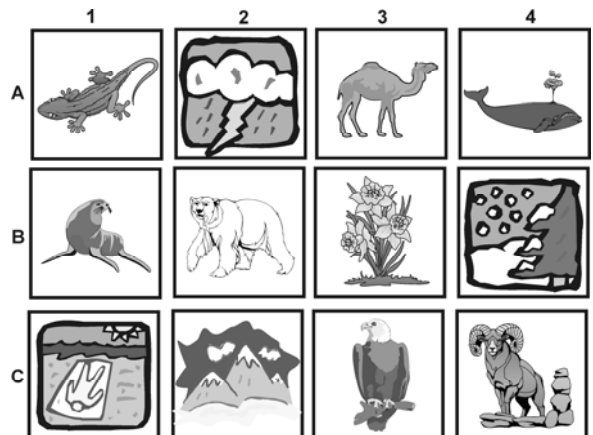
Two children, although they selected the correct card for floating, added “*not the pencil or the block*”. The presence of a boat in the picture may have provided a clue to the answer, as it is generally known that boats float.

**Project title: Trip Around the World**

Date of pre-test January 7, 2003

Date of post-test March 4, 2003

Number of children participating = 25



**Project overview**

This project introduced children to the following concepts:

- The Earth, its size and its landforms
- Animals on Earth and some of their adaptations
- The basic needs and adaptations of animals and people

The mini-projects were *Warm Places, Cold Places and High Places*.

**Responses**

Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the	
			pre-test	post-test
1 Show me what belongs in a warm place	A	1,3	44%	88%
2 Show me what belongs in a cold place.	B	1,2,4	36%	76%
3 Show me what belongs in a high place.	C	2,3,4	32%	48%

The results clearly demonstrate an increase in the understanding of the plants and animals that belong in each of these places.

During the pre-test, three children selected flowers as belonging to a cold place. Their choice may have been in response to activities in the Fall Garden project, which was completed prior to this project. Reasons for their choice included “*Flowers die when it’s cold*” and “*Flowers belong in a cold place because they go deeper in the snow*”. None of these children selected flowers in the post-test but made selections based on the activities they had completed for the World project.

**Project title: Trip Back in Time**

Date of pre-test March 4, 2003

Date of post-test April 22, 2003

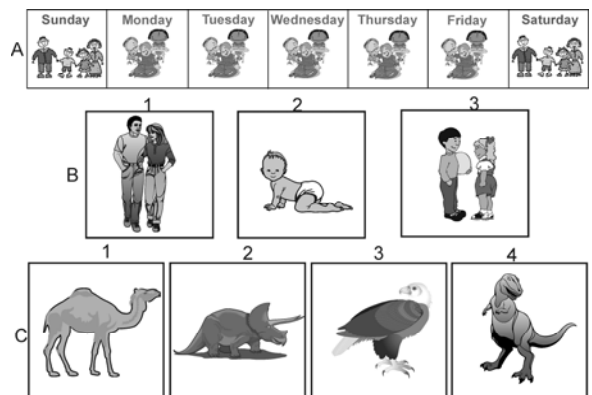
Number of children participating = 29

**Project overview**

This project introduced children to the following concepts:

- The evidence of time passing
- Personal growth and change over time
- Technological devices from the past
- How clues in our environment can help us to understand what may have happened long ago

The mini-projects were *These Days, Baby Days, Victorian Days and Dinosaur Days*.



**Responses**

For questions 1 and 2, using the picture set A, the interviewer would point to the day of the week and then asked children to show which day came before (or after) that day.

Questions	Picture set used	Desired response-picture(s)	% participants selecting a complete response in the	
			pre-test	post-test
1 Today is _____. Show me which day comes BEFORE today.	A	N/A	57%	69%
2 Today is _____. Show me which day comes AFTER today.	A	N/A	57%	69%
3 These pictures show children growing up. Which picture comes first, next, last?	B	3,2,1	31%	52%
4 Show me the animals that are alive now.	C	1,3	45%	48%
5 Show me animals that are extinct.	C	2,4	48%	48%

For question 3 it is interesting to note that in the pre-test many children (41%) arranged the pictures in the order adult → baby → child. This is a logical arrangement based on their experiences i.e. parents have babies who grow into children and is not wrong although considered so for this testing.

For questions 4 and 5 there was some confusion in selecting animals that are alive now and those that are extinct. Some children correctly identified the two dinosaurs as being extinct but also selected these animals as being alive now. The terms dinosaur and extinct are often heard together and this may have an effect on a child’s choice and may not indicate that the child understands the term “extinct”.

**Project title: Trip Under the Surface**

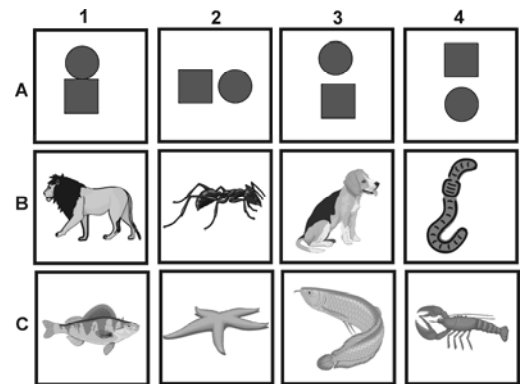
Date of pre-test April 22, 2003  
 Date of post-test June 10, 2003  
 Number of children participating = 27

**Project overview**

This project introduced children to the following concepts:

- Animal adaptations to life underground and underwater
- How people use technology to explore the underground and underwater world

The mini-projects were *Living Underground*, *Going Underground*, *Living Undersea* and *Going Undersea*.



**Responses**

Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the	
			pre-test	post-test
1 Which picture shows the red circle ON the green square?	A	1	56%	78%
2 Which picture shows the red circle OVER the green square?	A	3	15%	37%
3 Which picture shows the red circle UNDER the green square?	A	4	81%	93%

4	Show me all the creatures that live under the ground.	B	2,4	81%	85%
5	Which of these pictures show fish?	C	1,3	67%	85%

Before asking the first question, children were asked to point to all the circles, squares, red things and green things to ensure that they understand the symbols used. The pictures used for this question were very abstract in nature, and this might have affected the response rate. At the same time, it is interesting to note the number of children able to understand the abstract pictures and provide the desired response.

The responses show that the majority of the children had a good understanding of the concept of UNDER and more than half understood ON before any *Wings of Discovery*™ activities. However, participation in the science activities seems to have led to an increase the number of children understanding these concepts.

Once again, the majority of children had a good understanding of animals that live underground as well as the characteristics of fish before any Science activities but the results show that more children developed this understanding after participating in the activities.

**Project title: Trip To My Community**

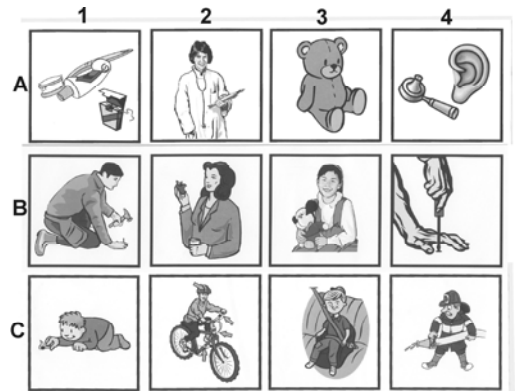
Date of pre-test June 10, 2003  
 Date of post-test July 22, 2003  
 Number of children participating = 18

**Project overview**

This project introduced children to the following concepts:

- How doctors and dentists keep us healthy
- Keeping safe on roads
- Properties of fire and fire safety
- The function and uses of tools
- How force makes toys move

The mini-projects were *Doctor's Office, Dentist's Office, Emergency Services, Clothing Store, Hardware Store and Toy Store.*



**Responses**

Questions	Picture set used	Desired response-picture(s) #	% participants selecting a complete response in the	
			pre-test	post-test
1 Which pictures show things that help to keep you healthy?	A	1,2,4	17%	61%
2 Which pictures show people using tools?	B	1,4	89%	100%
3 Which pictures show things that keep you safe?	C	2,3,4	44%	78%

In response to question 1, some children (4/18) included the teddy bear in their response for very logical reasons;

“They cuddle with you and make you healthy.”  
 “If you’re sad.”  
 “(They) make you not be scared.”

For question 3, the majority of children (89%) were already familiar with the car seat as a safety item as well as bike safety gear (72%). More than half (61%) also recognized the firefighter as something that kept you safe but the results show that less than half the children selected all three safety items.

Significant increases were seen in the number of children able to select all the required pictures for each question following **Wings of Discovery™** activities.

**Project title: Trip with Transportation**

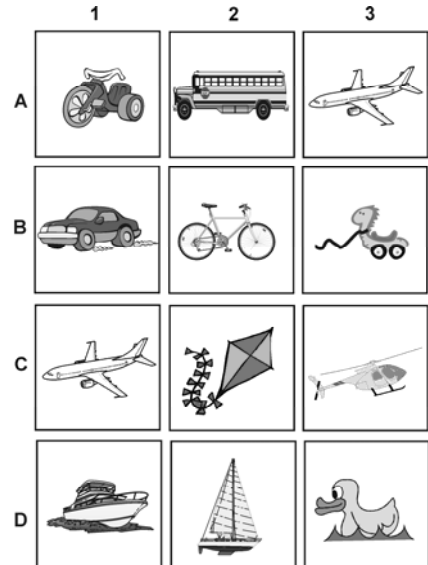
Date of pre-test July 22, 2003  
 Date of post-test September 2, 2003  
 Number of children participating = 14

**Project overview**

This project introduced children to the following concepts:

- Forms of transportation
- Needs of different forms of transportation
- How different forms of transportation are powered
- The advantages and disadvantages of different types of transportation

The mini-projects were *Trip by Water, Trip by Land, Trip by Air and Needs of Transportation.*



**Responses**

Questions	Picture set used	Desired response-picture(s)	% participants selecting a complete response in the	
			pre-test	post-test
1 Show me which one goes the fastest.	A	3	86%	86%
2 Show me which one goes the slowest.	A	1	71%	76%
3 Show me what you can use to travel on land.	B	1,2	100%	100%
4 Show me what you can use to travel in the air.	C	1,3	86%	100%
5 Show me what you can use to travel on water.	D	1,2	86%	93%

As the results indicate, the children were already very familiar with the concepts covered by these questions.



**Summary:**

The results of this evaluation process clearly show that ***Wings of Discovery***<sup>™</sup> projects and activities have a positive effect on the development of scientific core knowledge for the children participating in this study. Some projects show a greater influence than others and this may be due, in part, to the choice of questions asked (e.g., as with the transportation project) or the pictures used (e.g., the use of a bird and birdfeeder as an indication of winter in the Garden Project). Birds are seen throughout the year but the birdfeeder covered with snow is an indication of winter. Children of this age may have some difficulty in processing all the clues provided to come up with an answer. For future studies, pictures should be unambiguous to eliminate confusion such as this.

To identify a child's interest in Science, parents were asked to report on how often their child talked about Science and showed them what they did. Prior to the implementation of the ***Wings of Discovery***<sup>™</sup> program only 8% of parents reported their child as talking about Science while only 4% had seen what their child did in Science. At the end of the first year of implementation, 60% of parents reported that their child was talking about the Science they did at BLC and 40% reported that their child had showed them what they had done in Science.

Another indication of increased interest in Science is the children's request for more Science from the BLC staff. The frequency of Science activities has increased from 3 to 4 times per week with the children requesting Science of the remaining day of the week also.