

Volume

3



GUIDE

Nurturing Early Learners
A Curriculum for Kindergartens in Singapore

DISCOVERY OF THE WORLD

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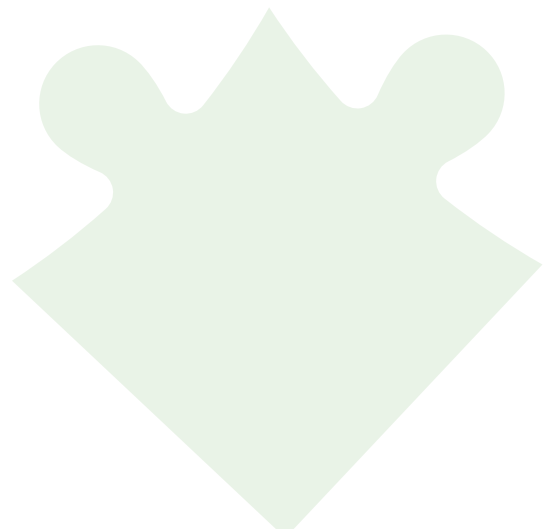
Introduction

Discovery of the World relates to children's everyday experiences and involves children learning how to explore and interact with all aspects of their environment. These may include their homes, schools, families, neighbourhoods, cultures, events and the wider world.

Children are naturally curious and are filled with wonder and fascination of the world around them. Due to their curiosity, they need opportunities to explore, experiment, manipulate, create, and learn about the world around them. Teachers play a critical role in facilitating the processes involved in helping children to satisfy their curiosities and excite them to make more discoveries.

Discovery of the World helps children widen their knowledge and acquire the essential skills and understanding to make sense of the world around them. It aims at sustaining children's natural curiosity to explore the world and lays the foundation for learning in geography, history and science.

For example, children may catch a grasshopper, put it in a jar, feed it, observe how it camouflages with its environment, and feel the joy of letting it go. Children can mix and sieve water and sand, measure the height of their constructions and mix water and flour to get dough. Children can predict whether it would rain by making observations of the colour, shape and size of clouds and the force of the winds. They could draw on their observations of the buildings around them to construct strong and stable structures at the Block Play Centre in class. They could investigate how people travelled far distances with the invention of the wheel to creatively build their own toy vehicles.





Discovery of the World in the Early Years

Children's discovery of the world begins with active involvement in what is going on in their immediate environment. Learning should be based on a sense of wonder and joy of discovery. The child as a curious, active and competent learner should be given opportunities to explore the world around them, ask questions, make close observations over time and think and talk about their observations. Instead of expecting children to understand logical and scientific concepts, the emphasis is on allowing children to apply inquiry or process skills such as observation, prediction, investigation and drawing conclusions in their learning experiences.

Making Sense of the World

Children discover the world around them through personal experiences, sensory experiences and planned experiences.

Personal Experiences

Children bring their own ideas, interests, and beliefs based on their own experiences and cultural settings as well as their own developmental abilities. They acquire knowledge of geography, history and science through first-hand experiences at home and in the pre-school. Teachers can talk to families to build upon children's prior knowledge and experience.

Examples

- Children who have their own pets or aquariums at home could build on this knowledge and experience when working with other children to set up a an aquarium at the pre-school centre.
- Children who have been to a hawker centre with their parents could describe the different types of food and talk about the taste and smell of local Singapore dishes.

Sensory Experiences

Children use their senses (touch, sight, smell, taste and hearing) to explore the world around them. They explore by scanning their environment, touching and handling what they see, and listening to sounds and getting excited by unusual noises.



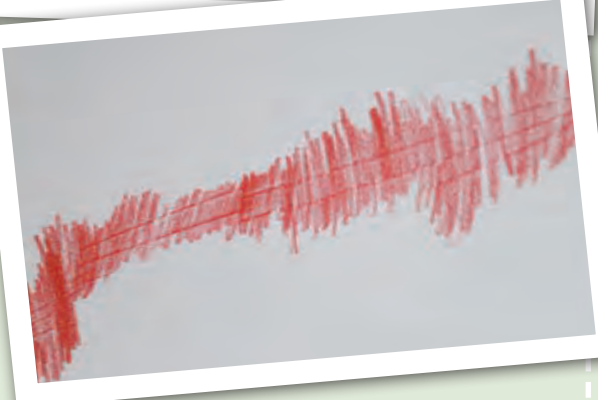
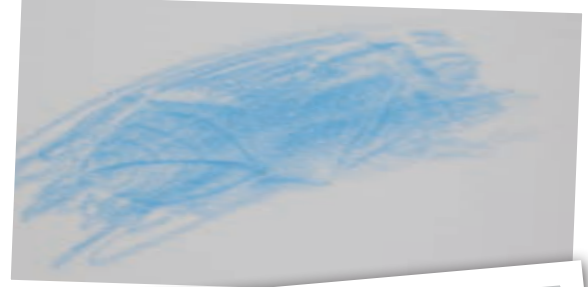
Children should be given ample opportunities to use their senses to observe and gather information about the world they live in.

Examples

- Blow soap bubbles and watch how they float and eventually burst
- Touch leaves or the bark of a tree and make texture-rubbings to discover the patterns
- Touch and feel the different textures of pebbles and rocks
- Smell freshly cut grass or fragrance of flowers
- Listen to the sounds and smell the food in a hawker centre
- Taste vegetables and fruits harvested from the garden at the pre-school centre
- Listen to the sounds of the trees and rustling leaves during a thunderstorm



Children blow soap bubbles and observe how they are carried away by the slightest breeze and eventually burst to discover their physical properties.



Children touch leaves and make colourful crayon leaf rubbings to look at the lines and patterns on the leaves.

Planned Experiences

Children gain better understanding of the world around them when they find out why things happen and how things work by exploring and discovering relationships of change and growth, and of cause and effect. Teachers could design a learning experience or set up an environment that allows children to observe these relationships taking place.

Examples

- Provide blocks of different sizes and encourage children to find out if the addition of one more block will cause their structure to collapse
- Provide a set of magnets and objects for children to observe their properties – pushing and pulling each other, attracting some objects and not others
- Collect leaves from around the school grounds for children to observe, describe, classify and compare by colour, texture and shape
- Arrange a field trip to the National Museum of Singapore or Asian Civilisations Museum for children to learn about life in the past



Children touch the seedlings and use a magnifying glass to closely examine the changes during plant growth at a Discovery Centre.

Skills Children Develop

Children's thinking evolves as they construct an understanding of people, objects and real life situations through first-hand experiences. As children observe, compare, ask questions, experiment and discover, they develop important process skills that are necessary for their future learning.



Children observe the properties of fruits before making comparisons and reporting what they have learnt.

As children are given opportunities to develop these process skills, they begin to gain confidence in their ability to think for themselves, reason, build connections, make representations and communicate their ideas to others.

The process skills that are emphasised in the early years include:

- Observing
- Comparing
- Classifying
- Predicting
- Experimenting
- Recording
- Communicating

Observing

Children use all their five senses to make observations and gather information to gain a greater understanding about their surroundings.

Examples of what children can do

- Use simple tools to examine details of things found during a field trip
- Note the change in colours as they mix two different colour paints
- Measure their shadows at different times of the day while they are outdoor and describe the different heights measured
- Describe what they see, feel and hear as they take a walk around the neighbourhood to find out about the buildings, amenities, environmental print and other geographical features
- Visit a park, garden or zoo to find out the characteristics of plants and animals



Children ask questions and describe what they saw as they use a magnifying glass to look at and observe small creatures.

Comparing and Classifying

When observing the environment, children can look at similarities and differences in real objects and categorise them into groups according to characteristics such as size, colour and function.

Examples of what children can do

- Compare the surfaces they walk on (e.g. gravel, grass, sand and concrete) during a neighbourhood walk and identify which is smooth and rough
- Compare an infant and a toddler and sort their clothes according to size
- Collect and compare fresh and dried leaves and classify them according to colour, size or texture



Children observe, compare and classify dried leaves collected from a neighbourhood walk according to colour.

Predicting

When making predictions, children can recall their prior knowledge during observation and data gathering, and make connections between what they see, what they have done and what they are currently focusing on. Then, they make informed guesses about what would happen next or in the future and provide simple explanations.

Examples of what children can do

- Predict the number of days needed for a tadpole to grow into a frog
- Predict which objects will float on or sink in water
- Predict whether it would rain by observing the clouds

Examples of questions teachers can ask

- *What do you think will happen if...?*
- *What do you think will happen next?*
- *What would have caused...?*

Experimenting

The process of experimenting involves testing ideas through an investigation. It includes wondering why something happened, asking questions, making predictions, suggesting a hypothesis and verifying it. Children acquire and validate information as they search for answers to their questions and develop new ideas and concepts at the same time.

Examples of what children can do

- Find out what happens when water, soapy water or oil is added to sand
- Find out what is needed for plants to grow
- Find out which materials, when wet, dry faster in the sun – paper, wood or cloth

Examples of questions teachers can ask

- *Why do you think...?*
- *What is...and why is...?*
- *How else can we...?*



Recording and Communicating Discoveries

Encourage children to make recordings of what they observed and gathered, and form opinions and conclusions based on their findings. When children make records of their findings, they are more precise about what they see, hear or touch and become more sensitive to the details in the environment. Children also need opportunities to share or show their discoveries either verbally or in drawings, artworks, construction models, play dough models, etc. which, in turn, help others to understand them.

Examples of what children can do

- Take photographs during a neighbourhood walk and use them to create a map of their neighbourhood
- Mark off days on a calendar to record the growth of a plant and draw a picture of its life cycle
- Make a model (e.g. using clay, ice cream sticks, etc.) of a bridge after looking at some photographs or books



A representation of information children have gathered about a topic allows them to show what they have learnt and provides opportunities for them to revisit the knowledge gained.

Attitudes Children Develop

In supporting children to learn about the world, developing positive attitudes or dispositions towards the learning area or activity is just as important as the acquisition of knowledge and skills.

Sense of Wonder and Curiosity

Children are naturally curious about the world they live in and it is necessary to nurture and sustain this disposition. Children with a sense of wonder and curiosity are not afraid to ask questions, explore new objects and discover new things.



Outdoor activities promote a sense of wonder and curiosity, encouraging children to express wonderment and share their interests and discoveries with their peers.

To nurture this sense of wonder and curiosity, teachers need to model the habits of inquiry through questioning and provide children with opportunities to gather and organise information to construct their own knowledge and understand why things happen and how things work. This creates an interest and excitement in learning, and encourages further exploration and discovery.

Besides asking children questions to arouse their curiosity, teachers should also encourage children to ask questions and wonder about things that are around them.

Examples of what teachers can do

- Ask a question then throw a ball to a child. The child answers the question and asks a similar or related question. The child then throws the ball to another child and the second child answers the first child's question and asks another related question. This continues until someone is unable to think of an answer or question.
- Put children in pairs. Have one child show their favourite toy or a picture of his/her favourite activity and the other child ask questions about the toy or activity. After a few minutes, have the children switch roles.
- Divide children into groups after a discussion of a topic or storytelling. Name each group a 'Wh' word (i.e. 'Who', 'Where', 'When', 'What', 'Why') and assign each group a number. Toss a dice and invite the group with the number shown to ask a question according to the name of their group. Write the questions on the board or flipchart paper and read the questions together with the class at the end of the activity. A project can be developed for children to find out the answers to the questions asked.



Children are encouraged to ask questions when a resource person such as a pilot is invited to the class to talk about his job.

Care and Respect for the Environment

Showing children how to care and respect their environment helps them learn how to care for themselves, their home, their community and people they love.



Children learn to show care and respect for living things as they explore, inquire and discover how animals and plants grow.

Learning experiences can be planned to teach children the wonders of all living things. For example, animals, like humans have senses - sight, hearing, taste, touch and smell, and feel pain, cold, hunger, thirst and heat. Children can learn to show care and respect for living things by feeding their classroom pet, watering the potted plants in the pre-school centre, and assisting their teacher to clean the aquarium in the classroom. As children care for living things, they develop a sensitivity and sense of responsibility for the life around them.

Besides helping children show care and respect for all living things, it is also important for teachers to explain the importance of keeping a clean and safe environment for everyone to live in. It is also necessary to emphasise the consequences of people's negative actions on the environment and how they would affect our lives.

Examples of what teachers can do

- Remind children to walk along the paths/walkways when visiting the park and avoid walking/stepping on flower beds
- Remind children to be gentle and quiet when viewing animals at the zoo or aquarium
- Remind children to keep the toilet floor dry all the time

Summary

Children are naturally curious and keen to explore and investigate the immediate environment around them. As teachers create and provide opportunities for them to discover and apply new knowledge, they learn to use the process skills that they need in order to make sense of the world they live in. At the same time, they develop positive attitudes towards the learning area and show care for the environment as they engage in exploration and discovery.





Learning Goals for Discovery of the World

Exploration and discovery begin with children's natural curiosity. Teachers can also inspire children by asking questions and modeling a sense of wonder themselves. The learning goals for Discovery of the World focus on the need for teachers to guide children to:

- Sustain and extend their curiosity
- Discover things for themselves
- Build on what they already know and understand
- Come up with their own solutions and reasons for explanations
- Cultivate a sense of care and appreciation of the environment

The examples in this chapter illustrate how teachers can provide opportunities for children to acquire knowledge, skills and dispositions of the learning goals.

Learning Goals 1 and 2

Learning Goal 1: Show an interest in the world they live in

Learning Goal 2: Find out why things happen and how things work through simple investigations

Key knowledge/skills/dispositions	Examples of what children's learning and development look like...
<ul style="list-style-type: none"> • <i>Use the five senses, simple tools/ technology (e.g. magnifying glass, gardening tools, camera) to explore the world they live in</i> • <i>Observe and be aware of the world they live in</i> <ul style="list-style-type: none"> - <i>similarities and differences in the environment (e.g. living things, non-living things)</i> - <i>patterns and changes that occur in the environment (e.g. day and night, growth and life cycles, past and present events)</i> • <i>Carry out simple investigations to find out why things happen and how things work</i> • <i>Gather information from a variety of sources (e.g. doing simple experiments, talking to classroom visitors or other experts, going on field trips, working with a variety of materials) to find out why things happen and how things work</i> • <i>Make simple recordings (e.g. drawing, making 3-dimensional models) of their observations and findings</i> • <i>Talk about their observations and findings</i> 	<ul style="list-style-type: none"> • Express wonderment and talk about their observations and experiences • Show interest in working and manipulating with a range of materials provided in the classroom • Share their interests and ideas with teachers and peers • Ask questions about why things happen, how things work and the lives of people familiar to them • Show enjoyment when observing, exploring and investigating things they are interested in • Use their senses to explore objects, materials and the environment (e.g. observe how a snail moves, touch and feel the texture of different types of rocks/leaves, smell flowers/ herbs/spices, listen to the sounds animals make) • Choose and use a wide variety of tools and equipment in their investigations safely and appropriately • Identify characteristics of things, places and events • Compare and classify things, places and events according to their characteristics • Begin to differentiate between past and present events in their own lives, and in those of their families and other people they know



Key knowledge/skills/dispositions	Examples of what children's learning and development look like...
	<ul style="list-style-type: none"> • Recognise and talk about cycles that occur in nature • Sequence events, routines and changes • Suggest and try possible solutions to solve problems • Guess and make predictions of outcomes with simple reasoning to explain a phenomenon (e.g. determining sinking or floating objects, objects that will move faster/slower) • Conduct simple experiments to test out ideas and predictions • Seek information by asking their parents, teachers or peers about things they do not know • Seek information from books, magazines, multimedia sources, pictures, photographs, maps, artefacts, visitors and field trips • Represent observation and information gathered in different ways (e.g. through drawings, labelling, modelling, writings, photographs) • Describe and share their personal experiences and what they have explored and discovered <p><i>Note: The examples of children's learning and development are neither age specific nor exhaustive. Teachers have the flexibility to provide appropriate learning opportunities based on their children's abilities, interests and developmental needs.</i></p>

Example 1: Observing snails



Learning Objectives:

Children will

- Observe and learn about the behaviour of snails
- Ask questions and talk about what they observe

Activity:

- Have children observe and talk about a snail they found from a neighbourhood walk. Encourage them to touch the shell and body and talk about how the shell and body feel like. Guide children in naming the parts of the snail (e.g. head, eyes, feelers, shell).
- Ask a group of children to look at and talk about the colours, patterns and shapes they see on the snail. Children can use a magnifying glass to make close observations of the snail.
- Ask children to watch closely at how the snail moves. Add a sense of wonder to this activity by asking *"I wonder how the snail moves without any legs."*, *"Can you think of other animals that have no legs?"*, *"How do these animals move?"*
- Invite children to ask questions about the snail.
- Get children to draw or make a play dough model of the snail.



Children use a magnifying glass to make close observations of the body and shell of a snail and look at how it moves before making a drawing of their observations.

Note: Make sure children wash their hands thoroughly after observing/handling the snails.



This drawing makes the child's thinking about the snail more visible, especially when the child's dictated comment was added to the drawing.



Example 2: Investigating how snails move

Learning Objectives:

Children will

- Observe the movement of snails on different surfaces
- Find out whether snails move faster or slower on wet, dry, rough and smooth surfaces

Activity:

- Have children predict whether a snail will move faster or slower on wet, dry, rough and smooth surfaces by asking questions such as “What do you think will happen if you pour some water onto the tray for the snail?” and “What do you think will happen if you put the snail on a tray of sand?”.
- Provide children with water, droppers, sand, cotton cloth and aluminium foil and ask children to do a simple experiment to find out whether the snail moves more on wet, dry, rough or smooth surfaces.
- Get children to talk about their findings and record their findings on a chart or other suitable graphic organisers.
- Encourage children to suggest other types of surfaces for the snail to move on for further investigations.



Children observe the movement of a snail as it moves on different surfaces to find out which surface it likes to move on.

Learning Goal 3

Learning Goal 3: Develop a positive attitude towards the world around them

Key knowledge/skills/dispositions	Examples of what children's learning and development look like...
<ul style="list-style-type: none">• Importance of responsibility, care and respect for living things and the environment• Impact of Man's actions on themselves, others and the world they live in	<ul style="list-style-type: none">• Recognise their role and responsibility in keeping the environment clean• Show care and respect for plants or pets displayed in the classroom or pre-school• Clear away unused materials after completing a task• Begin to recognise the importance of using recycled materials• Remind friends to turn off taps after washing their hands and not to litter <p><i>Note: The examples of children's learning and development are neither age specific nor exhaustive. Teachers have the flexibility to provide appropriate learning opportunities based on their children's abilities, interests and developmental needs.</i></p>



Recycling boxes can be set up in the classroom for children to sort used materials and to help them recognise the importance of using recycled materials.



Example 3: Show care and respect for living things

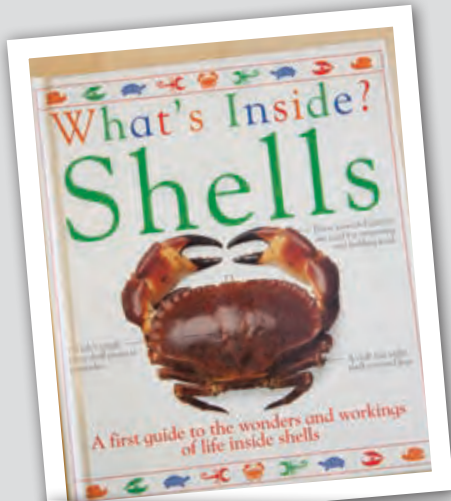
Learning Objectives:

Children will

- Show care and respect for the snail that is being observed in the classroom
- Create a good living environment for the snail
- Take turns to feed and clean the container for the snail

Activity:

- Read a book about taking care of pets.
- Use information books or the internet to help children learn about the parts of a snail, the habitat and food needed for snails.
- Share that living things, like humans, need food, shelter from harm, care and respect from others.
- Talk about proper feeding and care of the snail displayed in the class and ask the children to help with the responsibilities of caring for the snail.
- Remind children of the need to return the snail to its natural habitat once the observation and investigations are completed.



Story books and non-fiction books arouse and foster children's curiosity and offer opportunities for inquiry and discovery.

Summary

In helping children to move towards achieving the learning goals set for Discovery of the World, it is important to focus on the process and not the product. Children should have opportunities to develop and use process skills such as observing, comparing, classifying, predicting, experimenting, recording and communicating. Teachers need to frequently invite children's interest and build on their curiosity to allow them to explore, inquire and discover the world around them.



Strategies for Discovery of the World

Children's learning is enhanced when they have opportunities to find out the causes of and reasons for things that happen in the world. Teachers can plan and involve children in investigative activities to seek answers and make sense of what they discover. They ask questions, introduce concrete materials and provide resources to stimulate children's curiosity, and generate excitement to new discovery.

Strategies that encourage discovery of the world include:

- Asking questions
- Providing opportunities for simple experiments
- Inviting resource persons to the classroom
- Conducting field trips
- Providing opportunities for activities in the outdoors
- Using diagrams and graphic organisers
- Using children's literature and information books
- Using print media, technology and interactive media
- Modelling a sense of wonder and care for the environment

Asking Questions

Good questions excite and motivate children. The right question can lead children in the intended direction, engage them and spark off a new interest and a host of other questions.

A good question that supports discovery and critical thinking has focus, clarity, appropriate intonation and can do the following:

- Arouse and sustain children's interest
- Allow teachers to gain insights into children's prior knowledge
- Develop children's critical thinking and inquiring attitudes
- Extend children's thinking
- Help teachers assess children's achievement of learning goals

Give children enough time to respond to the questions asked. Wait several seconds for children to answer and do not appear impatient or undermine their thinking by answering your own questions.

Teachers can formulate and ask open-ended questions such as “*Why/How is this so?*”, “*What would happen if...?*”, “*What do you think?*” to challenge or extend children's thinking during large group time or when children are playing at the learning centres. Open-ended questions stimulate discussions. They can be used to encourage children to solve problems, make predictions and form opinions or draw conclusions about their activity. These questions also help to encourage a sense of wonder and curiosity. Teachers can also occasionally ask close-ended questions or questions that require simple, short and correct answers to help children recall information and focus their attention. Teachers should avoid asking close-ended questions that require a “yes” or “no” answer.

Examples of open-ended questions to encourage curiosity and critical thinking

- *What do you think will happen if you pour some water onto the tray for the snail?*
- *Why do you think the snail moves slower on a dry surface?*
- *How can you make the snail move faster?*
- *What are some other ways to make the snail move faster?*
- *Why do snails have shells?*
- *How is the snail different from the caterpillar?*

Examples of close-ended questions to help recall information and focus attention

- *What is the colour of the snail?*
- *What is the texture of the snail's shell? How does it feel like?*
- *What colours and patterns can you find on the snail's shell?*
- *What type of vegetables does the snail like to eat?*

Providing Opportunities for Simple Experiments

Children are engaged and captivated by things they can touch, manipulate and change as well as by situations that allow them to find out how things work and what happens.

Experimentation allows children to employ a variety of process skills and nurture positive dispositions as they make observations, test out ideas, collect information and make new discoveries through simple experiments designed by themselves to answer the questions they have.

In the course of experimentation, difficult concepts which are beyond the ability of a child to grasp may arise. However, developmentally, pre-school children are not expected to understand scientific concepts. Instead, they could be encouraged to explain them according to their own understanding and in their own words.



Children follow simple instructions to carry out experiments to find out how things work.

Examples of simple experiments

Experimentation can take place during water play when children are allowed to:

- Predict and determine which objects will float and which will sink
- Predict and determine which of a variety of materials will dissolve in water
- Predict which containers hold more or less water by finding out the number of cups of water needed to fill containers of different shapes and sizes
- Observe how water changes shape according to the container it is in
- Find out how many marbles are needed to make a plastic container sink
- Predict which materials (cloth or paper) will dry faster in the sun
- Guess and observe what happens when coloured food dye is added to water



Children predict which objects will float and which ones will sink by designing a simple experiment to test their predictions, record their findings and explain why they think some objects stay above water and others settle to the bottom.

Inviting Resource Persons to the Classroom

Professionals or people working in the community (e.g. policemen, firemen, doctors, nurses, school principals, veterinarians, chefs, pilots, architects, bus drivers, postmen) and people working in places like the library, supermarket, zoo, museums and art galleries are excellent resource people who will help the children find answers to their questions. These resource persons or experts can be invited to talk about their jobs, their roles and responsibilities and the tools they use. Children's family members can also be invited to share their roles, interests, hobbies and skills with the children. To gather information, children can brainstorm a series of questions beforehand and use them to interview the resource person.

Inviting resource persons to the classroom raises children's awareness of and helps them to appreciate the roles played by their family members and people working in the community and neighbourhood. Such involvement of community resources and family members enrich children's learning experiences and encourages the community and families to be involved in the education of children. It will also strengthen the pre-school-family-community connections.



Policemen are invited to the pre-school centre to talk about their work and answer the children's questions. This raises children's awareness of the role policemen play in the community.

Examples of resource persons

- Architects to talk about building designs and constructions
- Parents with a new born baby to help children understand how they have grown and developed
- Parents or grandparents who enjoy cooking and baking to talk about food from different cultures
- Gardeners to talk about their interests and experiences in growing different types of plants
- Sports enthusiasts/athletes to talk about what exercises are necessary and what food to eat to stay healthy and physically fit
- Doctors to demonstrate how they use things/instruments in their medical bags to perform medical checkups for the sick and help the injured
- Dentists to talk about dental care and what they do when people visit their dental clinics to allay the fears children might have when visiting the dentist
- Policemen/Firemen to talk about how they help the community and demonstrate basic tips to ensure personal safety and safety in the home

Conducting Field Trips

Field trips increase children's interests and understanding of their immediate environment and the world around them by allowing them to acquire and validate information in a more authentic environment. Field trips also promote respect, appreciation and a sense of wonder for the world around them. In addition, field trips provide opportunities for children to interact, cooperate and communicate with one another.

Neighbourhood walks that focus on buildings, amenities, environmental print and other geographical features can also be conducted to help acquire knowledge about their neighbourhood. For example, children can be encouraged to observe the patterns and numbers around them, feel the texture on surfaces they walk on such as gravel, grass, sand and concrete, and listen to the sounds around them.

Unlike an excursion, which is usually planned as a recreational activity for children at the end of a school term to make a tour of a place of interest, a field trip has a teaching and learning objective identified by the teacher and involves children's active involvement and participation during the trip. For example, a field trip to a vegetable farm provides children with sensory experiences to gather information and gain understanding of how vegetables are harvested and transported to the supermarkets or markets for sale.

For a field trip to achieve its objectives, it needs to be planned carefully, like any other activity in the pre-school centre. Refer to the Educators' Guide: Overview (pg 41 – 49) for further details on what teachers can do before, during and after a field trip.



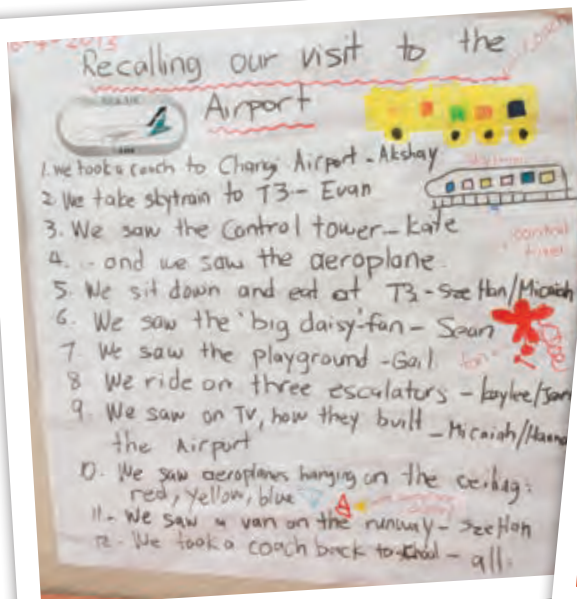
A trip to a supermarket allows children to develop and apply process skills such as making observations and recording how things are organised, labelled and classified.



Examples of interesting places for field trips:

- Shops in the neighbourhood such as a minimart, bakery, hair salon, pet shop, aquarium, clinic, florist, coffee shop
- Police station, fire station
- Community centre/club
- Primary school
- Nursery/park/vegetable farm
- Restaurant/fast food restaurant
- Airport

A trip to a neighbourhood bakery allows children to observe and find answers to their questions on how bread and cakes are made.



Creating a display board or poster to show the things children had observed or learnt after a field trip to the airport helps them recall, represent, reinforce and reflect on their learning.

Example: Planning a field trip to the National Museum of Singapore



Learning Goals:

Children will

- Show an interest in the world they live in
- Find out why things happen and how things work through simple investigations

Learning Objectives:

Children will

- Name and talk about the types of clothes people wear in Singapore
- Find out the types of clothes people wear in the past
- Compare and classify clothes people wear in the past and present

Suggested Pre-field Trip Activities:

- Show children photographs of adults and children in present and old Singapore and invite them to talk about the clothes they wear at home, in school and when they visit a friend or a special place.
- Show children photographs of adults and children in old Singapore and invite them to talk about the similarities and differences in the clothes they see in present and old Singapore.
- Create a 'K-W-L' chart and record the things children know about clothes. Tell children that they will be visiting the museum to learn about clothes people in Singapore wear in the past. Ask them to think of the things they want to find out from the visit.

Suggested On-site Activities:

- Sign up for the museum's educational programme, "Out of the Box! – My 60s Fashion Wardrobe" for children to discover Singapore's fashion in the past through dress-up, role-play and hands-on activities.
- Visit the museum's Fashion Gallery to view and learn about the clothes worn by women in old Singapore. Introduce the names of costumes worn by women of different ethnic groups (e.g. sari, sarong kebaya, cheongsam). Talk briefly about how clothes are made and let children observe the selection of fabrics on display. They can listen to the sounds made by a sewing machine, touch and feel the fabrics and examine the different colours and designs used. Children can either select and draw their favourite fabric or design and draw their own fabric.



Children dress up and role play in clothes that people wear in the past to experience how their grandparents would dress up when they were young.

Suggested Post-field Trip Activities:

- Encourage each child to talk about or describe something they had seen, heard or learnt from the visit to the museum. Record the things children have learnt on the 'KWL' chart created before the museum visit.
- Encourage children to reflect on their field trip experience by asking them questions such as 'What do you like best about the trip to the museum?' and 'How did you feel when you were in the museum?'
- Help children to create a display board, poster or scrapbook to show the things they had observed or learnt from the museum visit.
- Show children a sari, sarong kebaya and cheongsam and have children recall the names of these costumes. Ask children to select and "design" a costume for their mother.
- Invite an Indian parent to demonstrate how to wear a sari. Allow children to ask questions.
- Plan a project for children to investigate the work of a tailor and the process of making clothes. Simple sewing activities can also be designed to encourage creativity as children decide on the different patterns for sewing. The activity also allows children to practise eye-hand coordination and develop their fine motor skills.

More examples of interesting places for field trips:

- **Asian Civilisations Museum**
Children can learn about different Asian cultures and traditions through and engaging hands-on activities and role-play.
<http://www.acm.org.sg>
- **Butterfly Park and Insect Kingdom at Sentosa**
Children can view insects up close and take a hands-on approach to learn about nature and insects.
<http://www.jungle.com.sg>
- **Gardens by the Bay**
Children can explore the different types of non-native plants in the conservatories. In the free access area, children can also examine other plants that thrive locally.
<http://www.gardensbythebay.com.sg>
- **Hay's Dairies Goat Farm**
Children can take part in hands-on activities and learn about the different aspects of a goat farm.
www.haydairies.com.sg
- **Healthzone at the Health Promotion Board**
Children can learn more about healthy eating through the many displays available.
<http://www.hpb.gov.sg>



Children visit the Healthzone at the Health Promotion Board to learn ways to protect their teeth through the many displays available.

- **Jurong Bird Park**
Children can learn about the different types of birds, their habitats and diets.
<http://www.birdpark.com.sg>

- **Jurong Frog Farm**

Children can learn about the life cycle of a frog and gain insight into the different products that can be made from a frog.

www.jurongfrogfarm.com.sg

- **Maritime Experiential Museum**

Children can learn about seafaring in an Asian context and view the interactive exhibits.

<http://www.rwsentosa.com>

- **National Museum of Singapore**

Children can take part in workshops related to fashion, food and puppetry set in the local context.

www.nationalmuseum.sg

- **S.E.A. Aquarium**

Children can learn about marine conservation and take part in hands-on activities to learn about nature and underwater creatures.

<http://www.rwsentosa.com>

- **Singapore Botanic Gardens and Jacob Ballas Children's Garden**

Children can explore the Singapore Botanic Gardens and Jacob Ballas Children's Garden to find out about different types of plants.

<http://www.sbg.org.sg>

- **Singapore Civil Defence Heritage Gallery**

Children can learn about the heritage of our civil defence, view exhibits of items that were used by firemen and may even have the opportunity to talk to retired firemen.

<http://www.scdf.gov.sg>

- **Singapore Philatelic Museum**

Children find out about the job of a postman and learn about Singapore's rich heritage, nature, traditional games, trades and significant events, and transportation captured on stamps.

<http://www.sm.org.sg>



Children learn about the work of postmen through talks, demonstrations and hands-on activities at the Singapore Philatelic Museum.

- **Singapore Science Centre**

Children can learn about the human body, plants and animals, water and energy, weather and more from the exhibits, enrichment programmes and show at the Omni-Theatre.

<http://www.science.edu.sg>

- **Singapore Zoological Gardens**

Children can learn about many different animals, their habitats and diets.

<http://www.zoo.com.sg>

- **Sungei Buloh Wetland Reserve**

Children can learn about mangroves, a saltwater habitat unique to the tropics. They can also see up close many different animals which live in the mangroves such as mudskippers and crabs.

<http://www.sbwr.org.sg>

- **Underwater World**

Children can visit the Underwater World to learn about the different types of marine animals.

<http://www.underwaterworld.com.sg>



Children have a close encounter with different types of marine animals to observe and learn about their characteristics and habitat at the Underwater World.

Providing Opportunities for Activities in the Outdoors

The outdoor environment offer children first-hand contact with the natural world. It also allows children to be physically active and encourages them to explore freely through their senses and direct personal experiences. Children can smell flowers and plants, listen to the sounds of passing vehicles and birds chirping, feel the soft grass on their feet and experience the wind blowing on their face. As children explore the outdoor environment such as digging in the soil and picking up pebbles and rocks of different shapes and sizes, they learn about the nature of the surfaces of the earth, concepts of heavy and light, rough and smooth, and large and small. Such sensory experiences also help to foster children's sense of wonder and reinforce a positive attitude towards the environment and learning.



Children go outdoors to touch and make recordings of the plants they observe, and make texture-rubbings to discover the patterns on the bark of a tree.

Using Diagrams and Graphic Organisers

Drawing pictures, flow charts or diagrams is an effective strategy to help children understand sequence of events and changes. Visually representing the life cycle of an animal, plant growth and cooking procedures, allows children to process changes visually and make sense of what they experience. There are also many new vocabulary terms to learn, and things to identify, such as the parts of animals, plants, science tools and equipment. Drawing pictures of these things helps children remember the information and displaying these pictures on boards/walls allows the children to refer back to them when they need the information later.

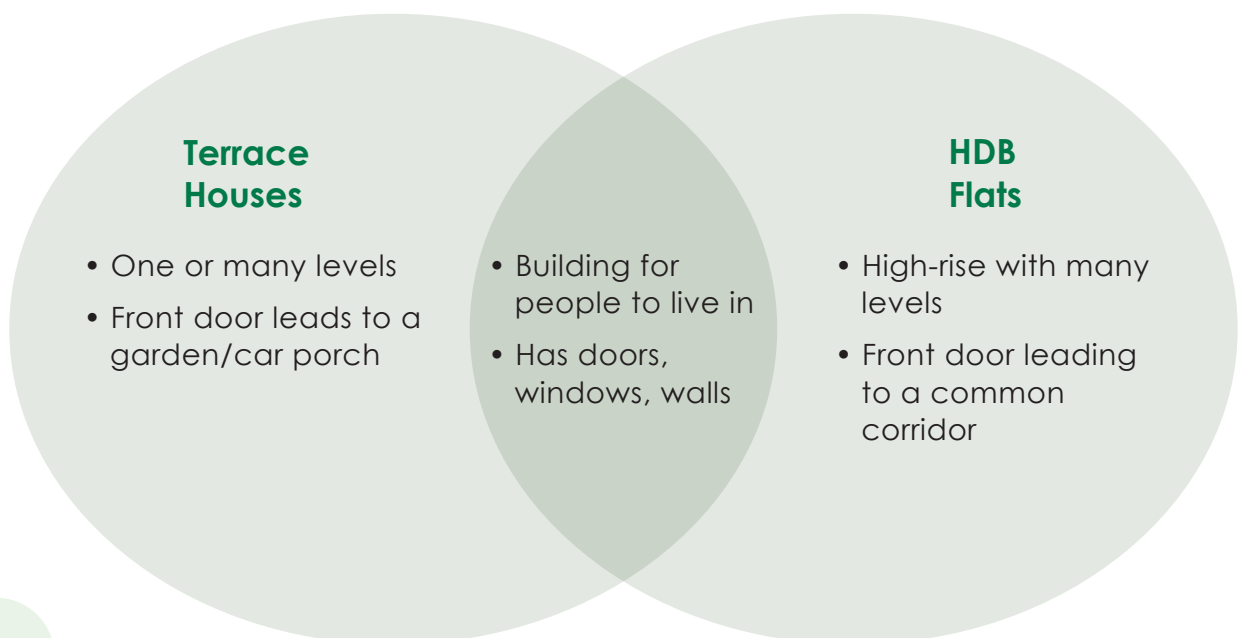
Graphic organisers can be used to clarify and break down almost any type of information. Teachers can use graphic organisers to:

- Guide children through the thinking process
- Help children classify and communicate their ideas
- Help children provide a visual and holistic representation of concepts and ideas, and their relationships

Some organisers, such as Venn diagrams, help children compare and contrast things. Other organisers help children sequence events such as food chains and water cycles. KWL charts help children and teachers figure out what they know (K), what they want to know (W) and what they have learnt (L). Graphic organisers can also be used to help children organise their thoughts when conducting investigations or experiments.

Examples

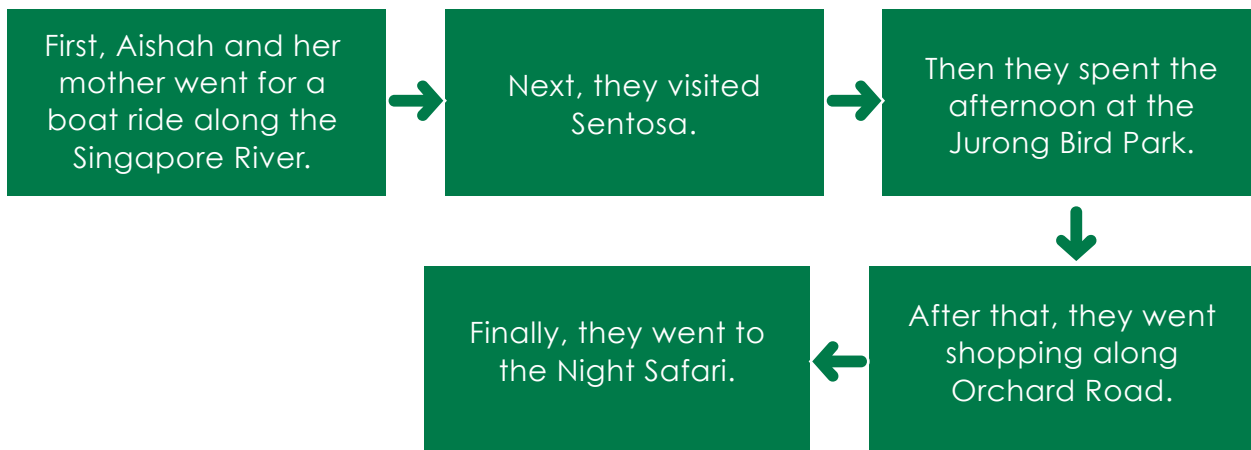
A Venn Diagram for Comparing and Contrasting



A KWL Chart

What we Know about Singapore	What we Want to know about Singapore	What we Learnt about Singapore
Singapore is very small.	How many people are there in Singapore?	Singapore is one of the smallest countries in the world.
There are many people living in Singapore.	Who lives in Singapore?	Singapore is a multi-racial country with Chinese, Malay, and Indian people.
It is very hot.	Why does it not snow in Singapore?	Singapore is near the equator and has a warm tropical climate.

A Diagram for Sequencing Events



A Diagram for Elaborating Ideas



Using Children's Literature and Information Books

There are many picture books and non-fiction books about the environment written especially for young children. The sentences are simple and illustrated with vivid pictures. They are excellent stimulants for eager and inquisitive minds. Children's literature not only provides content knowledge and fosters process skills; it also arouses children's curiosity and offers opportunities for inquiry. Literature supports children's interest in learning about the world by presenting content knowledge in a more relevant and meaningful context to help children understand relationships and how things work.

Information or non-fiction books not only give the adults facts, but suggest activities for children. Teachers can take advantage of the coloured illustrations and pictures to stimulate children's sense of wonder at the beginning of an activity/project, research for details in the middle of the activity/project and provoke further investigation at the end. These books can either be displayed at the Literacy Centre or Discovery Centre to allow children to browse through and look for information related to a specific theme/topic in discussion.

Using Print Media, Technology and Interactive Media

Technology and interactive media are tools that can promote effective teaching and learning when they are selected, used, integrated and evaluated intentionally and in developmentally appropriate ways. Photographs, videos, DVDs, movies, slides television programmes, e-books, the Internet, software programmes, applications (apps), and other computer simulations of things linked to a topic/theme in discussion can be used and shown to the children to extend and expand their knowledge about the world.



Technology and interactive media are tools that are effective only when used appropriately in ways that promote active engagement and interactions.

Children can also use technology and interactive media to find information, learn a new skill or communicate with others. When utilising these tools, teachers should check and ensure that the content is developmentally and age appropriate and meets the intended learning objectives.

As with other resources or tools, technology and interactive media should be used in moderation and to enhance and be integrated into classroom experiences, not to replace essential activities (e.g. outdoor play, reading aloud), interactions (e.g. with peers and teachers) and materials (e.g. paints, crayons, blocks) in an pre-school setting.

Modelling a Sense of Wonder and Care for the Environment

Teachers' interest and appreciation of the natural world and the environment will spark and sustain children's curiosity of their environment. When a teacher is an interested, curious and respectful observer, children's awareness of the environment would be modelled after the teacher's example. The teacher's own sense of wonder and interest in finding out more about something is vital as it demonstrates the behaviour and skills the teacher wants for the children. Teachers are strongly encouraged to use language such as *"I wonder where/how/why..."* when thinking aloud.

Children also imitate and display positive attitudes towards the environment by observing adults' reaction and behaviour. Through adults' responses towards rocks, shells, plants, animals, cultures of different races and habits of disposing trash, recycling and reusing scrap materials, children learn to care for and respect the environment.



Children observe objects in the environment and make detailed recordings of their observation. The teacher's role is to encourage inquiry and discovery by modelling a sense of wonder and showing interest in finding out more about the environment.

Some Activity Ideas

There are many interesting activities that can be carried out to enable children to explore, inquire and discover the world around them. Below are some examples:

Theme: Who Am I?

Topic	Activities
My Body	<ul style="list-style-type: none">• Sort things according to different stages of growth (e.g. things for a baby and things for a 4-/5-/6-year old child)• Use the sense of touch to explore textures and shapes of various objects in the environment, beginning with those seen in the classroom before moving to the outdoors• Use the sense of taste and smell to explore sweet and sour food• Use the sense of hearing to listen to sounds produced by objects in the environment
Healthy Food	<ul style="list-style-type: none">• Talk about the "Food Pyramid" and match the food children eat with those on the pyramid• Construct a food pyramid with scrap materials to highlight healthy food items• Talk about good eating habits
My Neighbourhood	<ul style="list-style-type: none">• Take a neighbourhood walk to look at the different types of buildings, facilities and environmental print• Draw a simple map for a neighbourhood walk• Construct a model of the neighbourhood using recycled/ scrap materials• Visit a primary school or community centre/club to look at its facilities

Topic

Activities

- Talk about the places of interest in Singapore using online search engines, photographs, videos, brochures, books, etc.
- Identify a place to visit, and draw something they like most about the place
- Visit a museum to have an awareness of the Singapore history
- Talk about special events in Singapore – e.g. National Day Parade, The Great Singapore Sale, celebration of festivals important to the four ethnic groups, etc.

Singapore, Our Sunny Island



Children create their own map of the places of interest in Singapore after identifying the various places from a Singapore map.



Children celebrate Singapore's birthday on National Day and talk about what they know and like about their country.

Topic

Activities

Singapore Food

- Talk about the types of food people eat for breakfast in Singapore and where you can buy them
- Taste a variety of food that are unique/common to the four ethnic groups in Singapore
- Taste unique local food; e.g. Hainanese chicken rice, fried rice, fried vermicelli, roti prata, fried mee siam, etc.
- Visit the hawker centre/coffee shop/food court to observe the setting, types of food sold, food preparation and interview the hawkers about when they start/finish work
- Identify and observe different tropical fruits and talk about different ways to eat them



Children learn about the distinct characteristics of local food when they taste and talk about a variety of food that are unique or common to the four ethnic groups in Singapore.

Theme: Who Are the People/What Are the Places Around Me?

Topic	Activities
People in the Community	<ul style="list-style-type: none"> • Invite resource persons or professionals from the community to give a talk about their work and the tools/equipment they use to help them do their job • Observe and examine how some tools/equipment are used in different jobs; e.g. stethoscope, police whistle, fire hose, ladder, mail bag, a pair of scissors, hair dryer, etc. • Role play a particular community facility; e.g. post office, police post, medical clinic, dental clinic, hair salon, etc.



Children engage in functional role play at the "medical clinic" set up to provide an authentic context for the development of children's language, social skills, imagination and creativity.



Children practise their fine and gross motor skills, language and numeracy skills as they role play the baker, customers and cashier in a bakery set up as a learning centre.

Topic	Activities
Our Environment	<ul style="list-style-type: none"> • Talk about how children can help to keep the classroom clean and safe; have them develop their own class rules, and decide what they wish to do to keep their classroom clean and safe to play and work • Discuss pollution issues reported in newspapers • Introduce campaigns such as “Clean and Green” and “Eco-living” and talk about how children can contribute to keep the environment clean and green
Houses We Live In	<ul style="list-style-type: none"> • Talk about the different types of houses in Singapore • Listen to sounds made by common things found in the house • Talk about the different rooms in the house and how they are used by the family • Compare the architecture of different types of houses in Singapore • Explore the properties of materials used to build houses • Make a model of a house/room using scrap/recycled materials • Compare the architecture of houses in present and old Singapore • Visit Chinatown/Katong area to look at the designs and patterns on doors and windows of the houses; have children draw one of the patterns they observed

Theme: Who Do I Share the World With?

Topic	Activities
Pets	<ul style="list-style-type: none"> • Take turns to feed and care for a classroom pet (e.g. fish, hermit crab, terrapin) • Construct homes of pets using wooden blocks, interlocking bricks and scrap/recycled materials • Invite a veterinarian to the class to talk about caring for pets and what they do for pets when they fall sick or are injured • Visit a pet shop/aquarium to find out the types of pet food, pet care products and other accessories that pets need

Topic	Activities
Animals	<ul style="list-style-type: none"> • Observe the features and movement of different animals at the Singapore Zoological Gardens or watch a video about animals • Make a collage of animals using materials of different textures; e.g. cotton wools, cardboard, feathers, pencil shavings, sticks, etc. • Match/sort/compare animals according to their characteristics and habitats • Make clay models of animals • Interview a zookeeper and role play zookeepers working in the zoo <div data-bbox="371 728 1324 1451" style="text-align: center;"> </div> <div data-bbox="427 1458 1297 1608" style="text-align: center; border: 1px dashed gray; padding: 5px;"> <p><i>A field trip to the zoo allows children to observe the features of different animals and talk to a zookeeper to find out more about animals.</i></p> </div>
Garden Animals	<ul style="list-style-type: none"> • Take a walk around the neighbourhood garden to observe insects, spiders and worms • Draw or make a play dough model of small animals found during a walk in a nearby garden based on observations of their physical characteristics and behaviour • Talk about and observe the life cycle of butterflies and beetles • Visit the "Fragile Forest" at the zoo

Topic	Activities
Sea Creatures	<ul style="list-style-type: none"> • Visit the Underwater World in Sentosa/S.E.A. Aquarium to observe and identify sea creatures • Make a mural of sea creatures observed/learnt about <div data-bbox="480 394 1501 1227" data-label="Image"> </div> <div data-bbox="571 1227 1437 1406" data-label="Caption"> <p><i>Children can work in groups to make a mural of sea creatures observed during a field trip to the Underwater World in Sentosa or the S.E.A. Aquarium.</i></p> </div>
Plants	<ul style="list-style-type: none"> • Observe colours and shapes of flowers and leaves • Examine the patterns on flowers, leaves and fruits • Conduct a simple experiment to investigate and observe how seeds and plants grow • Collect and observe seeds of different fruits and draw the differences between them • Make texture rubbings of leaves and bark to create a collage • Talk about plants that grow underground • Visit a nature park (e.g. Botanic Gardens, Jacob Ballas Children's Garden or take a walk around the neighbourhood park) to observe plants and trees, and examine how they are different from each other

Theme: How Do Things Work?

Topic	Activities
Colours	<ul style="list-style-type: none">• Observe the effects of mixing primary colours• Observe how colours change using colour paddles• Learn about how animals use colours for camouflage• Conduct simple experiments to observe the colours that make up black ink• Conduct a simple experiment to make old coins look shiny again
Shapes	<ul style="list-style-type: none">• Identify common objects based on their shapes• Explore shapes with straight and/or curved edges• Compare the shapes of an inflated and deflated balloon
All Kinds of Food	<ul style="list-style-type: none">• Observe changes occurring between uncooked and cooked food (e.g. popcorn, agar-agar)• Identify and practise using suitable cutlery for different types of food• Role play people in a restaurant, food court or bakery (e.g. waiters, cashiers, chefs/cooks, cleaners, customers, bakers, etc.)• Visit a supermarket or a wet market to observe the things that are sold there
Weather	<ul style="list-style-type: none">• Describe the various weather conditions outside the classroom (e.g. sunny, rainy, windy, cloudy)• Name and identify activities for different weather conditions• Make comparisons between day and night• Conduct a simple experiment to investigate the effects of wind on light and heavy objects• Conduct a simple experiment to investigate the best type of fabric to make a raincoat
Air	<ul style="list-style-type: none">• Watch the path of inflated balloons when they are released• Conduct simple experiments to investigate the properties of air (e.g. how to 'suck' an egg into a bottle, how to prevent spillage from an inverted cup of water)

Topic	Activities
Rocks and Stones	<ul style="list-style-type: none"> • Conduct a simple experiment to observe formation of sugar crystals • Observe, compare and classify rocks and stones according to shape, colour, size and texture • Explore properties of dry and wet rocks and stones • Compare properties of sand and soil
Light and Shadows	<ul style="list-style-type: none"> • Talk about the invention of light bulb • Talk about the importance of light and sources of light • Conduct a simple experiment to show how shadows are formed • Create puppets for shadow play • Explore how mirrors or shiny surfaces reflect light
Out in Space	<ul style="list-style-type: none"> • Make 'space ships' out of recycled boxes of different sizes • Role play launching of rockets and astronauts on the moon
Land Transport	<ul style="list-style-type: none"> • Talk about and practice safety rules when crossing the road • Observe people's behaviour at a bus interchange/MRT station and set up a bus interchange/MRT station for children to role play • Role play appropriate behaviours when travelling in a car, MRT, bus or any other public transport (e.g. taxis) • Observe and compare between different types of land transport • Explore the speed of toy cars on slopes of different heights by running them down ramps supported by blocks
Water Transport	<ul style="list-style-type: none"> • Visit the Singapore Maritime Experiential Museum to find out how ships were used in the past • Compare different types of boats/ships and talk about how each type is used to benefit people • Talk about accidents at sea and the harm they cause to sea creatures
Air Transport	<ul style="list-style-type: none"> • Compare different types of air transport and their uses – aeroplanes (passenger/freight), helicopters, private jets, etc. • Have a race with paper aeroplanes that children make • Visit Changi Airport to observe how aeroplanes take off and land • Set up an airport terminal as a learning centre and have children role play as immigration officers, check-in counter clerks, pilots, flight attendants, etc.

Topic	Activities
Simple Machines	<ul style="list-style-type: none"> • Explore how pulleys, gears and levers work; and find out how they are used • Create machines using pulleys • Talk about how people live before the invention of machines such as telephones, mobile telephones, computers, televisions, etc. • Experiment with magnets and find out how they are used by people
Machines in the House	<ul style="list-style-type: none"> • Explore how telephone works • Observe movements of a washing machine and talk about how and why it turns/churns • Talk about different types of clocks and how they work, in particular an alarm clock • Talk about how other machines used in the household work by having children hypothesise and guess – e.g. dishwashers, water filters, DVD players, computers, etc.

Summary

Teachers need to be familiar with and use a variety of strategies and learning activities which are fun and engaging for children to promote inquiry and discovery of the world.

Chapter

4



Organising the Learning Environment

An environment that promotes inquiry and discovery should be one where children are actively involved in observation, exploration, investigation, experimentation, drawing conclusions and problem-solving. Such an environment must be thoughtfully and deliberately created by organising both indoor and outdoor spaces to encourage children to explore and interact with the world around them and to learn to care for it.

Indoor Space

The indoor spaces of a pre-school centre are often organised into different learning centres to help children work in small groups and concentrate on developing specific skills while they play. Specific spaces that focus on Discovery of the World can be set up to promote specific knowledge, skills and dispositions. Such spaces in the classroom are commonly labelled as Discovery Centre where children are engaged in a variety of activities that allow them to explore with a range of materials, discover information and solutions and draw conclusions about a question they have asked or a hypothesis that they have made. Other possible learning centres include Nature Learning Centre and Explorers' Centre.

The learning of knowledge and skills in Discovery of the World can also be integrated in other learning centres such as the Construction or Block Play Centre and Art and Craft Centre if teachers carefully arrange and structure them for children to:

- Engage in meaningful and first-hand experiences
- Work, play and interact with their peers and teachers
- Have ready access to tools to facilitate problem solving and experimentation



Construction/Block Play Centre allows opportunities for children to represent their world or neighbourhood in 3-dimensional form.

Discovery Centre

The Discovery Centre is an area specially designed for children to

- Learn about things they have seen in the environment
- Explore new topics of interest
- Develop process skills such as making observations, problem solving and decision-making

Children are free to visit and revisit the Discovery Centre, discuss the resources displayed and even create/develop related resources. The topic could be changed regularly but be maintained long enough to ensure most children have visited the area and short enough to keep the children curious about what topic would be displayed next.

An indoor Discovery Centre may look like this:



Setting up a special area or Discovery Centre with live specimens, simple tools/equipment and resource books allows children to practise observation skills using their five senses and look for information to support their learning.



Resources for the Discovery Centre

A learning centre that encourages the development of knowledge, skills and dispositions in Discovery of the World contains a diversity of resources that excite children's natural interest, encourage many questions and promote inquiry. There must also be enough materials and equipment for all the children to work with.

Teachers need to be intentional when selecting resources and arranging the area. The choice of materials and equipment will have to meet the needs of the learning objectives and goals of the curriculum. It is also important for teachers to anticipate potential hazards and take appropriate safety precautions to ensure that the materials and equipment are safe for the children's use. Teachers will need to teach, demonstrate and assist children in using the materials and equipment at the Discovery Centre.

The materials should facilitate opportunities for children to examine things closely, practice observation skills using their five senses, learn about cause and effect, compare and contrast, experiment and make predictions, record observations, draw logical conclusions from their observations, and communicate what they have learnt.

For example, for the topic on 'Symbols/Signs Around Us', the Discovery Centre could display photographs/charts/posters of examples of the different environmental print (e.g. street signs, food labels, advertisements, signboards for shops) around us and where they are found and their functions. Children could refer to the resources and create their own signs and symbols for the classroom, pre-school centre and even their neighbourhood.

The table below provides a list of basic materials and equipment to be placed in the Discovery Centre. These include natural materials, living things, science tools, visual materials and recycled materials. Additional materials and equipment can also be added to the list to complement the existing theme/topic under study.

Natural Materials	Living Things
<ul style="list-style-type: none"> • Flowers, fruits and vegetables • Seeds, leaves • Wood, twigs, branches • Seashells • Feathers • Rocks, stones, pebbles • Herbs and spices <p>Including natural objects in the learning environment gives children opportunities to interact more closely with nature. Natural materials provide children with a range of sensory experiences. They enhance the learning experience with appealing aromas, colours, sounds and textures. Appreciation of the natural world is further strengthened when natural materials are incorporated into the indoor environment.</p>	<ul style="list-style-type: none"> • Plants, terrariums • Aquarium • Live specimens of insects and other small animals (e.g. meal worms, caterpillars, snails, tadpoles) <p>For children to learn about plants and animals, live specimens can be placed at the discovery centre for them to observe their features and growth patterns. Children must learn to care for the living things and observe safety rules and be responsible when handling pets invited to their classroom. They must be taught to return all living creatures to their natural habitats after making their observations.</p> <p>Children can also learn to be responsible by caring for animals and plants. For example, they can plant beans in paper cups. As they take turns to water the plants, they can also watch the plant grow and keep a record of the changes that occur (e.g. changes in the height of the plant or size and colour of leaves).</p>



Science Tools	Recycled Materials
<p>Observation tools:</p> <ul style="list-style-type: none"> • Magnifying glasses, viewfinders • Mirrors • Torchlight <p>Measurement tools:</p> <ul style="list-style-type: none"> • Weighing scale, measuring cup • Strings, rope • Strips of paper • Unifix cubes <p>Materials to aid transfer:</p> <ul style="list-style-type: none"> • Plastic droppers • Tongs, plastic tweezers • Strainers, sifters, plastic funnels <p>Miscellaneous:</p> <ul style="list-style-type: none"> • Magnets • Pulleys, levers, gears • Pinwheels, wind chimes • Cotton wool • Marbles, buttons, beads <p>For children to be actively involved in carrying out simple experiments to find out how things work and happen, it is essential that they have simple tools/technology (e.g. magnifying glass, measuring cup, torchlight etc.) to facilitate their investigations as well as materials that they are curious to find out more about (e.g. small machines, pulleys, magnets etc.).</p>	<ul style="list-style-type: none"> • Plastic bottles, clear containers • Toilet rolls • Cardboard boxes, egg cartons • Aluminium pie pans • Aluminium drink cans • Bottle caps • Ice cream sticks • Old glass jars (can be used for collection) • Old magazines and newspapers <p>To raise children's awareness of how to care for the environment and how to conserve materials, discarded reusable items can be placed in the Discovery Centre. As the children select materials for reuse, model making, creating new products or making art projects, they develop creativity and responsible behavior towards the environment.</p> 

Visual Materials	Materials for Recording Purposes
<ul style="list-style-type: none"> • Information or non-fiction books/posters, picture books • Maps, globe, atlas • Photographs, postcards and pictures • Videos <p>To raise children's geographical and historical awareness, a globe, a map of Singapore and pictures of the neighbourhood can be displayed. Children could be asked to identify where their grandparents/great grandparents came from – a chart could be made of the various parts of the world from which their forefathers came. A collection of old, black and white photographs and things that remind people of the past could be displayed for the children to look at and compare with the things used today.</p>	<ul style="list-style-type: none"> • Paper, pencils, crayons, colour pencils, markers • Audio recorder • Camera <p>In the Discovery Centre, the children will be carrying out many simple investigations and making many observations. Hence, it is useful for them to have materials for recording their observations and findings. Besides recording by drawing or writing, it might also be useful to have a camera/audio recorder to better capture the observations and findings.</p>

Construction/Block Play Centre

The construction/Block Play Centre allows opportunities for children to represent their world in 3-dimensional form. They can construct models of buildings, facilities and parks in their neighbourhood or objects in the environment that fascinate them. Such opportunities enhance spatial and geographical awareness as the children become more interested in structural designs of buildings, roads and bridges. Children are also problem-solving as they make decisions about the building/construction plans and think of ways to carry out their plans. For example, teachers can ask children to build a structure that will be strong and stable enough to support a toy figure and find out who can build the tallest and most stable structure.

The Construction/Block Play Centre is usually an active area with lots of activities and conversations and should be placed in an area where it will not disturb quiet activities like reading and painting. A nice big rug in the area is useful to create a kind of boundary for this area and also to reduce the noise level. Often, it is helpful to surround this area on three sides to discourage other children from walking through the area and disturbing the masterpieces in progress. Children's completed model or work in progress should be kept and displayed for children to revisit and describe their model as well as to recall and reflect on the construction process such as how they worked together as a group, what they liked best about the process, and what they would do to make their model better.

Materials which can be put in the Construction/Block Play Centre to encourage exploration and experimentation include large and small wooden blocks, foam blocks, building bricks, cardboard boxes, toy people, toy animals and toy vehicles.

Pictures and photographs of different types of structures can be displayed at the Construction/Block Play Centre to serve as a stimulus for the children to model and build.



Children make decisions about their building plans and learn to problem solve as they explore blocks and materials of different shapes and sizes to create a tall tower.

Outdoor Space

Virtually anything that is outdoor can become a discovery experience for young children. Learning outside of the classroom can help nurture the curiosity and sense of wonder in children as opportunities are provided for them to explore with natural visual and tactile learning materials. For example, children could check out if magnets can be attracted to the fence, swing, brick wall, soil, etc.

Outdoor activities also provide children with many opportunities to develop social skills such as verbal communication, turn taking, sharing, cooperation and friendship building. Organising the outdoor spaces to facilitate children's learning will help to create even more opportunities for exploration, interaction and purposeful play.

Since outdoor spaces are exposed to environmental conditions, it is important that the area does not overheat, as it can be especially dangerous for children. Adequate shade may come in the form of shady trees planted nearby. An awning can also be used to create a sheltered outdoor space under which sand and water play may be situated. The artificial surfaces outdoors should also be made of non-slip material, especially if the area is prone to getting wet when it rains. With the high humidity that Singapore experiences, materials that may rust should also be avoided. The outdoor spaces can be organised into water and sand play centres, and gardening spaces.

Water and Sand Play Centres

Water and Sand Play Centres are ideal places for children to learn about physical properties of liquids and solid. Children develop mathematical and scientific concepts as they pour water, observe containers floating and explore wet and dry sand. Furthermore, as they manipulate different tools such as colanders, sieves, funnels, pipes, droppers, sponges, spray bottles, scoops, shovels, pails, and containers, their gross and fine motor skills and eye-hand coordination are being developed.



Besides developing scientific concepts, children refine their gross and fine motor skills as they dig into the sand, scoop sand and pour them into pails and containers.



It is advisable to set up the Water and Sand Play Centre outside the classroom as children at these centres are active and can be noisy. Being outside, children will feel freer to explore as they need not worry too much about spilling and splashing.

Teachers can provide a variety of materials at the Water and Sand Play Centres for children to engage in free exploration. Mild liquid detergent and food colouring can also be added into the water or sand to spark new discoveries and ideas. The similarities and differences between clear and soapy water or wet and dry sand can then be recorded.

To introduce a concept, teachers should be more selective and purposeful in providing the materials and should join the children to observe and interact with them. During concept introduction, teachers ask questions and draw attention to significant comments that children make, such as when a child fills a container and empties it into a bottle and said, "Hey! They are the same." This observation helps children develop concepts and ideas about volume, capacity and properties of water.



Water play allows children to develop concepts and ideas about volume, capacity and properties of water as they explore pouring water into and out of containers.

Gardening Space

Gardening offers many possibilities to children. A gardening space can be reserved for children to enjoy digging in the soil and learn about the composition of soil as well as learn about the insects and worms that make their homes there. The process of planning and planting can provide children with hands-on experiences and can spark many possible investigations. Children can start test plots, where they vary the conditions for plant growth and observe how one plot is growing better than another. This is also an opportunity for the children to learn responsibility by caring for plants.

The plants and flowers may also attract birds, butterflies, other insects and small animals. This will allow children opportunities to hunt for eggs, caterpillars, ants, etc. and to observe them daily to see them change and grow. Bringing an insect indoors for closer observation will also add excitement to a story or an activity.



A space designated for gardening can provide children with hands-on experiences to learn about plant growth and small animals.

Summary

Children develop an understanding of themselves and the world around them through their interactions with the people, materials and the environment around them. The environments that children experience in their daily lives are responsible for creating their understanding of many concepts, giving them spatial awareness, inviting their curiosity and encouraging their interaction.



The turtfle is
swimming in the pond

Observation and Assessment

Activities involving explorations and investigations are a natural part of early childhood experiences. These include mixing paints, planting seeds, picking stones and leaves during neighbourhood walks, listening to the sounds of vehicles, and observing animals. Evidence of how and what children are making sense of the world around them comes from these everyday experiences.

Observing and Documenting Children's Learning

Children's everyday experiences in the pre-school centre provide the settings in which teachers can observe and find out what and how children are making sense of the world around them. Stay close to the children when they are exploring or experimenting such that you can easily see and hear them. When children are involved in discovering their world, take time to observe what your children are interested in. This can be done by paying attention to what they are looking at, listening to what they are talking about and noting what they are choosing to do.

Records of children's conversations, anecdotal notes and photographs of their actions and samples of their drawings and constructions provide evidence that help teachers gain a deeper understanding of how and what children are thinking about the world around them. As teachers collect, describe and interpret evidence of children discovering and making sense of the world around them, they create more appropriate opportunities and experiences for children to revisit, reinforce and reflect on their learning.

Teachers can observe, document and interpret information collected to find out what children know, can do and understand with regard to the three learning goals for Discovery of the World. The key areas for observing and assessing are children's

- Sense of wonder and curiosity in the world they live in
- Attitude towards exploration and experimentation
- Attitude towards the world around them

When observing children discovering their world, bear in mind the following questions:

- What questions are children asking?
- What do the children talk about during their investigations?
- What materials or equipment do the children choose to gather information and make discoveries?
- How do the children react to new materials introduced in the classroom?
- How much details have they observed?
- What comments do they make about their discoveries?
- How are the children challenging each other's thinking process?
- What does the information or work sample collected or incident reveal about the child's interest and curiosity?
- How do the children record and report what they have learned and discovered?
- What do children's recording show about their understanding? Are there gaps or misunderstanding? Do they show an application of concept or skill that was introduced previously?

The drawings and comments children make, and questions they ask often provide insights into whether the children are able to apply what they have learnt or if they have misunderstood newly-acquired knowledge and concepts. To ensure better congruence in assessment, teachers can consider the following:

- Collect different forms of evidence that show children demonstrating their understanding
- Collect the forms of evidence over a period of time to show the evolution of an idea or concept children are developing or their patterns of thinking
- Collect evidence when children are working individually or in group settings



Children create collages after a discussion on marine animals to show their basic understanding of the characteristics of turtles and fish.

Examples of How Observations are Documented

Example 1



Context:

Children were taking a walk in the nearby park to look for small creatures when Junxiang suddenly exclaimed, *“Look, there’s a snail!”* A group of children gathered around Junxiang who was looking at a snail found under a bench. Children were excited and were heard asking, *“Is it alive?”*, *“Why is it not moving?”*, *“What is it doing there?”*, *“Where is it going?”* Junxiang picked up the snail and asked if he could bring it back to the classroom to find out more about it. Teacher allowed Junxiang to bring the snail into the classroom but explained to him that he would need to return the snail to its natural habitat after a few days. Junxiang responded, *“Otherwise, it will die.”*

Teacher’s Anecdotal Record:

- Junxiang spotted a snail during a walk in the park and stopped to look at it.
- He was not afraid of the snail and even picked it up gently with his bare hands.
- He was curious about the snail and started to ask questions about it.

Possible Interpretation/Assessment:

- Junxiang showed an interest in living creatures and shared his interest with his friends and teachers.
- Junxiang exhibited a sense of wonder and curiosity and was eager to examine the snail to find out more about it.
- Junxiang was aware of the needs of living things and showed respect for living creatures.

What the Teacher Could Do:

- Allow Junxiang to observe the snail and encourage him to talk about his observations and ask questions about it. Ask him to record and represent his observations of the characteristics of the snail through drawings, collages or play dough models. Encourage him to write (if possible) and include his comments about what he discovered to make his learning and thinking visible. Alternatively, he can describe his observations and the teacher can write it for him.

- Write down the questions Junxiang asks about snails and help him to investigate and find out the answers by seeking information from books, magazines, multimedia sources, asking his parents and experts, and conducting simple experiments.
- Introduce the book, "Are You a Snail?" by Judy Allen to arouse Junxiang's curiosity in the life cycle of a snail. Allow him to observe the life cycle of mealworms and encourage him to make predictions, make simple recordings of the changes taking place and report his findings.
- Conduct simple experiments to allow Junxiang to find out the living conditions for the snail such as type of leaves/vegetables the snail eats, requirement for dry/wet and sunny/shady environment, and type of surface for the snail to move on.

Documentation:

Teacher could document Junxiang's sense of wonder and curiosity, and interest in the world around him by including:

- Samples of drawings with written comments (either by Junxiang or teacher) to show Junxiang's focused and detailed observations of the features of the snail such as the colours, lines and patterns on the shell, the shape and size of the shell and body parts.
- Records of Junxiang's conversations with his friends when observing the snail and conducting simple experiments.
- A series of Junxiang's recordings of changes observed during investigations of the living conditions for the snail.

Example 2



Context:

At the Discovery Centre, Hema and Pei Ling were looking at a chart of objects and guessing which objects would float and which ones would sink. As the two girls did not always make the same guesses, Hema was seen trying to influence Pei Ling to have the same guess as her. The teacher approached the girls and asked “How can you find out which objects will float and which ones will sink to check your guesses?” The girls asked the teacher if they could have the real objects to test if they float or sink. The teacher agreed and helped them to collect the objects and a basin of water for their simple experiment. The teacher also gave them pieces of paper for them to record their findings. After the experiment, Pei Ling and Hema showed their drawings of the floating and sinking objects to the teacher and told her what they found. The teacher encouraged them to show their recordings and reported their findings to the whole class.

Teacher’s Anecdotal Record:

- Hema and Pei Ling volunteered to work at the Discovery Centre.
- They looked at the new chart placed at the Discovery Centre and tried to make guesses of floating and sinking objects on their own without the teacher’s assistance.
- Hema was quick to guess and would try to hurry Pei Ling to make a decision. Pei Ling tended to take a longer time to guess and would sometimes choose the same object as Hema when hurried.
- Before the experiment, Pei Ling suggested that they draw a line on the paper to create two columns to record floating and sinking objects. When doing the experiment, both girls took turns to place the object in the water. They watched the object for a while before deciding whether it floated or sank. Each one then made a drawing of the object independently on their paper. Both girls showed their recordings and reported their findings to the class with some assistance from the teacher.

Possible Interpretation/Assessment:

- Hema and Pei Ling showed an interest in working at the Discovery Centre.
- They were keen to find out more about floating and sinking objects and enjoyed the experiment.

- Hema and Pei Ling demonstrated that they were able to apply process skills such as predicting and conducting a simple experiment to test out their ideas and predictions. They could also make simple recordings of their findings and share them with the teacher and the class with some assistance.
- The two girls worked cooperatively.
- They were confident when sharing about their work with peers and the teacher.

What the Teacher Could Do:

- Ask them why they think certain objects floated and others sank. Help them connect and extend their learning by encouraging them to collect more objects to test out their predictions. (Children may come to the conclusion that heavier or bigger objects generally tend to sink in water while lighter or smaller objects tend to float. Although this is an acceptable first explanation by the children, make sure that children are aware that weight is not the only factor to determine whether an object will float or sink. Children can learn more accurately about density in their later school years for a fuller understanding of the concept.)
- To extend learning, get the children to explore how the shape of an object can change its buoyancy. For example, get children to find out whether two clay balls of equal weight and shape will float or sink. Flatten one of the clay balls and form it into a boat shape. Then ask the children to find out whether both shapes will sink.
- Give the children a variety of small objects such as marbles, pebbles, bottle caps and buttons to explore the effect of additional weight on the buoyancy of plastic containers. Ask them to find out what happens when they add the small objects into the plastic container. *“Do they make it sink?”* The children can also find out the number of small objects needed to make the plastic container sink.

Documentation:

Teacher could document Hema and Pei Ling's ability to conduct a simple experiment and comment on their thinking process by including:

- Records of their conversation when guessing which objects will float and which ones will sink.
- Photographs of them doing the experiment.
- Samples of their drawings of floating and sinking objects.



Summary

Observing and monitoring children's learning and development is an integral part of the teaching and learning process. Teachers are encouraged to collect information about children's progress in achieving the learning goals for Discovery of the World. This can be done through ongoing observations and documentation of children's attitudes toward exploration and experimentation, and the world around them, as well as their acquisition of knowledge and skills from their learning experiences.



Bibliography



Abruscato, J.A. & DeRosa, D.A. (2009). *Teaching children science: a discovery approach (7th Ed.)*. Pearson.

Harlan, J.D. & Rivkin, M.S. (2008). *Science experiences for the early childhood years (9th Ed.)*. Upper Saddle River, NJ: Pearson/Merrill Prentice Hall.

Lind, K.K. (2000). *Exploring science in early childhood education: a developmental approach. (3rd Ed.)*. Delmar Thomson Learning.

National Association for the Education of Young Children & the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College. *Technology and interactive media as tools in early childhood programs serving children from birth through age 8*. Retrieved 15 January, 2013, from www.naeyc.org/files/naeyc/file/positions/PS_technology_WEB2.pdf

Ritz, W.C. (Ed.). (2007). *A head start on science: encouraging a sense of wonder*. National Science Teachers Association.

Saracho, O.N. (2012). *An integrated play-based curriculum for young children*. New York: Routledge.

Seefeldt, C., Galper, A. & Jones, I. (2012). *Active experiences for active children: science (3rd Ed.)*. Upper Saddle River, NJ: Pearson.



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