

**DEPT** Department of  
Educational  
Planning and Training  
Ministry of Education  
The Union of Myanmar



# *Teacher's Guide*

## *Basic Science (Grade 4)*



JICA LIBRARY



1176395[0]

March 2004

International Development Center of Japan (IDCJ)

SCS
JR
04-011

**DEPT** Department of  
Educational  
Planning and Training  
Ministry of Education  
The Union of Myanmar



***Teacher's Guide***  
***Basic Science (Grade 4)***

**March 2004**

**International Development Center of Japan (IDCJ)**



1176395【0】

## Table of Contents

<b>How to use this Teacher’s Guide</b> .....	i
<b>What is CCA?</b> .....	iv
<b>Designing CCA lessons</b> .....	xi
<b>Assessment for CCA</b> .....	xiv
<b>Basic Science-Note for Teachers</b> .....	xvi
<b>Chapter 1 Living things</b> .....	<b>1-1</b>
<b>Topic 1 Different type of living things</b> .....	<b>1-2</b>
Concepts and Objectives .....	1-2
Before getting started .....	1-2
Lesson planner .....	1-6
Activities .....	1-8
1. We are all born .....	1-8
2. Write your daily activities .....	1-9
3. What plants need 1 .....	1-11
4. What plants need 2 .....	1-12
5. Story telling, Van Helmont's tree .....	1-13
Lesson plans .....	1-14
1-1 Plant produces own foods 1 .....	1-14
1-2 Plant produces own foods 2 .....	1-16
1-3 Foods animal s eat .....	1-18
1-4 Characteristics of living things .....	1-20
Assessment .....	1-21
<b>Topic 2 Animals</b> .....	<b>1-24</b>
Concepts and Objectives .....	1-24
Before getting started .....	1-24
Lesson planner .....	1-32
Activities .....	1-34
1. Vertebrate and Invertebrate .....	1-34
2. Mammal .....	1-35
3. Reptile and Amphibian .....	1-36
4. Observing a feather .....	1-37
5. Think about general characteristics of Birds .....	1-38
6. Observing a gill and scale of fish .....	1-39
7. Think about general characteristics of Fish .....	1-40
8. Benefits and harms from animals .....	1-41
9. Harm for animals from human .....	1-42
Lesson plans .....	1-43
2-1 Vertebrate and Invertebrate .....	1-43

2-2 Mammals .....	1-45
2-3 Amphibian and Reptiles .....	1-46
2-4 Benefits from Animals .....	1-48
Assessment .....	1-49
<b>Topic 3 Plants .....</b>	<b>1-50</b>
Concepts and Objectives .....	1-50
Before getting started .....	1-50
Lesson planner .....	1-58
Activities .....	1-60
1. Observation on the parts of cultivated plants and wild plants .....	1-60
2. (a) Parts for food storage of plants .....	1-61
3. (b) Parts for food storage of plants .....	1-69
4. Parts for an edible plant .....	1-70
5. Making a list through observing different edible parts of plants .....	1-71
6. Parts of the herbs .....	1-72
7. How else can parts of plants be used? .....	1-73
Lesson plans .....	1-74
3-1 Food storage plants 1 .....	1-74
3-2 Food storage plants 2 .....	1-76
3-3 Plants as construction material .....	1-78
Assessment .....	1-79
<b>Chapter 2 Matters .....</b>	<b>2-1</b>
<b>Topic 4 Matters in environment .....</b>	<b>2-2</b>
Concepts and Objectives .....	2-2
Before getting started .....	2-2
Lesson planner .....	2-4
Activities .....	2-5
1. Volume of liquid 1 .....	2-5
2. Volume of liquid 2 .....	2-6
3. Calculate the volume of cubes .....	2-7
4. Story telling (Archmedes and gold crown) .....	2-8
5. Measuring irregular shape of solid .....	2-9
6. Measuring weight by hand .....	2-10
7. Volume and weight .....	2-11
Lesson plans .....	2-12
4-1 Measuring volume of liquid .....	2-12
4-2 Measuring volume of solid .....	2-13
4-3 Same volume and different weight .....	2-14
Assessment .....	2-16
<b>Topic 5 Properties of matters .....</b>	<b>2-17</b>
Concepts and Objectives .....	2-17
Before getting started .....	2-17

Lesson planner .....	2-19
Activities .....	2-20
1. Expansion and contraction of solid .....	2-20
2. Expansion and contraction of liquid 1-1 .....	2-21
3. Expansion and contraction of liquid 1-2 .....	2-22
4. Expansion and contraction of liquid 2-1 .....	2-23
5. Expansion and contraction of liquid 2-2 .....	2-24
6. Expansion and contraction of gas 1-1 .....	2-25
7. Expansion and contraction of air 1-2 .....	2-26
8. Expansion and contraction of air 2-1 .....	2-27
9. Expansion and contraction of air 2-2 .....	2-28
Lesson plans .....	2-29
5-1 Solid expansion and contraction .....	2-29
5-2 Before and after heating conditions of the matters .....	2-31
5-3 Before and after heating conditions of the objects .....	2-33
Assessment .....	2-35
<b>Chapter 3 Energy .....</b>	<b>3-1</b>
<b>Topic 6 Light .....</b>	<b>3-2</b>
Concepts and Objectives .....	3-2
Before getting started .....	3-2
Lesson planner .....	3-4
Activities .....	3-5
1. Think about light sources .....	3-5
2. Light travels in a straight line .....	3-6
3. Pinhole camera .....	3-7
4. Making shadow .....	3-8
5. Longer and shorter shadow .....	3-9
6. Changing the path of lights 1 (Collecting sun light by using mirrors) .....	3-10
7. Changing path of lights 2 (Collecting sun light by using mirrors) .....	3-11
8. Light comes with heat .....	3-12
Lesson plans .....	3-13
6-1 Light travels in a straight line .....	3-13
6-2 Changes of light paths .....	3-15
6-3 Light and Heat .....	3-16
Assessment .....	3-17
<b>Topic 7 Electricity .....</b>	<b>3-18</b>
Concepts and Objectives .....	3-18
Before getting started .....	3-18
Lesson planner .....	3-21
Activities .....	3-22
1. Making the electric circuit .....	3-22

2. Which circuit is good to light 1 .....	3-23
3. Making the electric circuit with two batteries .....	3-24
4. Making the electric circuit with two batteries .....	3-25
(parallel and series connection)	
5. Which circuit is good to light 2 .....	3-26
6. Tester (conductor and non insulator) .....	3-27
Lesson plans .....	3-28
7-1 Electric circuit .....	3-28
7-2 Electrical circuit with two batteries .....	3-29
7-3 Tester (conductor and non insulator) .....	3-32
Assessment .....	3-34
<b>Topic 8 Movement (Force and Motion) .....</b>	<b>3-35</b>
Concepts and Objectives .....	3-35
Before getting started .....	3-35
Lesson planner .....	3-38
Activities .....	3-40
1. Feeling "Force" .....	3-40
2. What will happen when force is added 1 .....	3-41
3. What will happen when force is added 2 .....	3-42
4. What will happen when force is added 3 .....	3-43
5. What will happen when force is added 4 .....	3-44
6. What will happen when force is added 5 .....	3-45
7. Motion is caused by Force .....	3-46
8. Regular force/regular motion, irregular force/irregular motion .....	3-47
Lesson plans .....	3-48
8-1 Various forces/Shape changes with force .....	3-48
8-2 Motion caused with force .....	3-51
8-3 Motion caused by various forces .....	3-54
8-4 Regular motion and irregular motion .....	3-56
Assessment .....	3-59
<b>Chapter 4 The Earth and Space .....</b>	<b>4-1</b>
<b>Topic 9 Weather .....</b>	<b>4-2</b>
Concepts and Objectives .....	4-2
Before getting started .....	4-2
Lesson planner .....	4-4
Activities .....	4-5
1. Practice measuring temperature with a thermometer .....	4-5
2. Measuring temperatures at different places .....	4-6
3. Measuring temperatures at different places <sup>2</sup> (how air gets warm) .....	4-7
4. Temperatures at different areas in Myanmar .....	4-8
5. Temperatures at different areas over the world .....	4-9
Lesson plans .....	4-10
9-1 Temperatures at different places .....	4-10

9-2 How air gets warm .....	4-12
9-3 Different temperatures at different areas in Myanmar .....	4-13
9-4 Different temperatures at different areas over the world .....	4-14
Assessment .....	4-15
<b>Topic 10 Erosion .....</b>	<b>4-16</b>
Concepts and Objectives .....	4-16
Before getting started .....	4-16
Lesson planner .....	4-20
Activities .....	4-22
1. How erosion happens .....	4-22
2. Type of soil erosion .....	4-24
3. Field excursion: Seeing erosion in real field .....	4-25
4. How erosion can happen .....	4-26
5. How erosion happens and prevents .....	4-27
6. Discussion: How erosion happens and prevents .....	4-28
7. Extreme erosion .....	4-29
8. Soil erosion is seen commonly .....	4-30
Lesson plans .....	4-33
10-1 Soil erosion .....	4-33
10-2 Causes of soil erosion .....	4-36
Assessment .....	4-39
<b>Topic 11 The earth, the moon and the sun .....</b>	<b>4-41</b>
Concepts and Objectives .....	4-41
Before getting started .....	4-41
Lesson planner .....	4-43
Activities .....	4-45
1. Space of the earth .....	4-45
2. Story telling (The earth is round) .....	4-46
3. The size of the earth 1 .....	4-47
4. The size of the earth 2 .....	4-48
5. The rotation of the earth (day and night) .....	4-49
6. The moon and the sun .....	4-50
7. Distance to the moon .....	4-51
8. Distance to the sun .....	4-52
9. Space of the moon .....	4-53
10. The shape of the moon .....	4-54
11. The moon going around the earth .....	4-55
12. Story telling (moon and sun) .....	4-56
13. The earth and other planets .....	4-57
14. Movements of the Earth, the Moon and the Sun .....	4-58
Lesson plans .....	4-59
11-1 Shape and size of the earth .....	4-59
11-2 Day and Night (spinning of the earth) .....	4-61



11-3 Moon	4-62
11-4 Sun	4-64
11-5 Movements of the Earth and the Moon	4-66
Assessment	4-68

## How to use this Teacher's Guide

### Targets

This Guide is created mainly for primary school teachers to teach Basic Science. To teach the contents in Basic Science with delight and to let students understand them more deeply, primary teachers can use this Guide. This Guide can provide various ideas and information necessary to teach Basic Science from child-centered point of view. In this sense, this can be useful for education concerned people such as trainees and trainers in the Education Colleges. It is appropriate to use this Guide not only as teacher's guide for primary school teacher, but also as textbook in the Education Colleges.

### Keys for effective use of this Guide

The design of this Guide adopts an index style. You can search necessary information quickly without reading through all things. Basically you can pick up only necessary parts to get information and to prepare the lessons. However, if you have time, it is highly recommended to take enough time to read through this Guide. Because this Guide introduces child-centered approach (CCA) which is new for Myanmar's education and fully understanding this concept usually requires more time and serious consideration.

### Contents

It is significantly important for readers who are unfamiliar with the idea of CCA to read carefully chapter I: "Designing Child-Centered Approach (CCA) Lesson." Even for readers who are familiar with CCA, it is highly recommended to read the section of "CCA Lesson Process," which can provide a concrete idea of CCA lesson process

#### (1) Basic Concept of CCA

This part introduces a new concept of child-centered approach (CCA) for Myanmar's education.

#### (2) Designing CCA Lesson Plans

This section can provide a specific procedure of producing CCA lesson plans by steps. It include Classroom Management methods which make most effective and comfortable educational environment for CCA lessons. You can get important information of how to make a lesson plan by reading this section.

#### (3) Assessment

In this section, various assessing methods that can be widely used in Myanmar's primary education are introduced. In addition, what assessing methods can be used most effectively in various kind of situation is suggested.

## II. Basic Science - Note for Teachers

### (1) Objectives of Basic Science

### (2) Strands in Basic Science

### (3) Basic Science and CCA

### Topic \*\*\*

### (1) Key Concept

### (2) Learning Objectives

### (3) Activities involved

### (4) Self-check list

### (5) Background Information for Teachers

### (6) Lesson Planner

This chapter provides the framework of Basic Science at the primary level of education in Myanmar. When you are teaching specific topics and items everyday, you tend to forget why you teach such topics and for what purpose you teach these. Without a whole picture of teaching subjects, it is impossible to provide good lesson for children. If you have questions of "why you teach this," it is suggested to review this chapter and get the whole picture of Basic Science.

What are the most important points of Basic Science to implement CCA lessons are written as the message to teachers

This describes about what actually you need to teach. Please read carefully to understand key-concepts of each topic.

This describes what you expect from the children at the end of the lessons. All activities are chosen to reach these objectives.

This indicates important points of activities that make children's learning most effective and enjoyable in each topic.

Before getting started please use self-check list to confirm your knowledge about a topic. This helps you to feel confidence about the topic. If you are not sure about that you can check information following.

This Guide includes information that makes the lessons rich and interesting. Some information is necessary to teach the topic, but the others do not seem to be directly related with the topic. You do not necessarily have to tell all information in the class, you can choose some of them if you think it will be useful and interesting for children. Depending on the situation of the class, teacher sometimes tell some interesting fact to motivate children for farther studying.

This helps you to make a complete plan for a topic, using this planner you can develop your own lesson plan by yourself as far as you do not change sequence of the activities (They are following the learning process). Feel free to adjust activities in the lesson planner to your situation. This planner is the 'help' not the 'load'. Please be flexible and even try to find suitable activities as far as you are not away from key-concepts and the learning objectives.

Assessment/review is included, so that you can check children's learning outcome constantly and improve Teaching/Learning procedure if learning outcome is still weak.

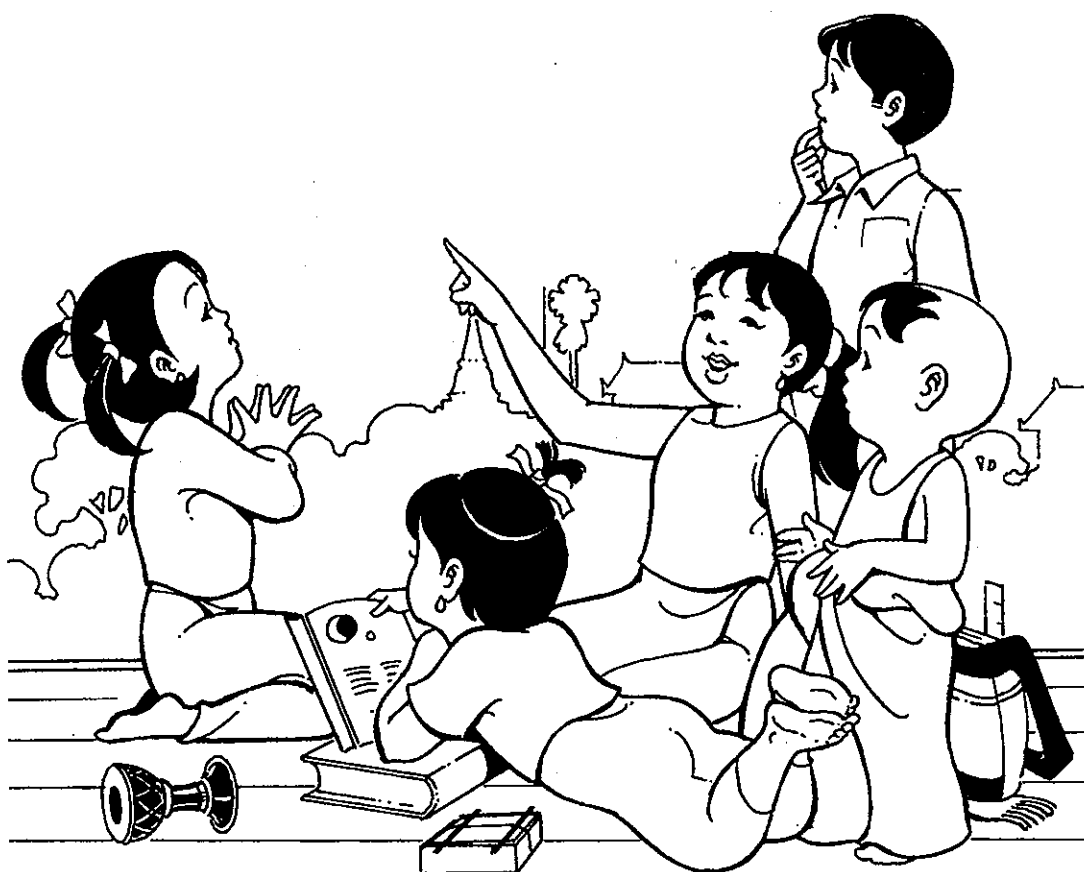
**(7) Activity**

This part is showing examples of activities you can utilize in lessons. However sequence is recommended to follow for children's learning process, therefore if you follow the activities, at the end of all lessons children can learn Basic Science concepts systematically.

**(8) Lesson Plan**

The lesson planner and the lesson plans are the examples among various ways of teaching. You can refer these ideas to make your own lesson plans (see Designing CCA Lesson Plan section). However you do not necessarily have to follow these ideas. It is highly recommended to pick up activities and create your own original lesson plans.

# What is Child Centered Approach (CCA)



# What is CCA?

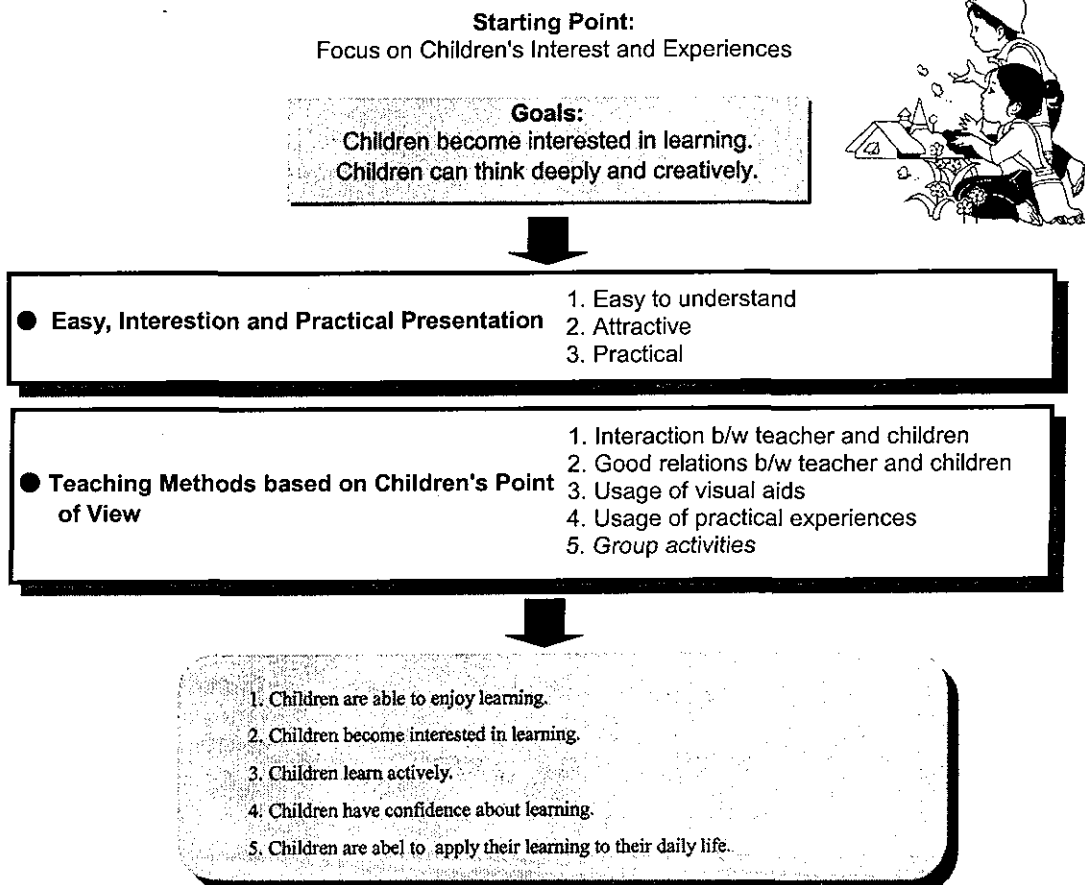
## Basic Concept of CCA

The present rapid social changes have resulted in an increase in the complexity of knowledge, information and technology that teachers and children have to deal with. Therefore, it is now necessary to effectively attract the attention and interest of children in the classroom through transforming the conventional teacher-oriented approach into the child-centered approach (CCA).

Myanmar's conventional teacher-oriented approach whose main activity is memorization by heart, does not provide children with the capacity to understand the complex content of various fields of study or offer techniques necessary for everyday life. It does not improve children's thinking or problem solving skills. It can provide children with only a large amount of facts without offering any chance to think about them.

Rather than attempting to pass knowledge on to children through the teacher-to-children-one-way process, CCA recognizes the rich receptivity in children and seeks to build upon it through concrete experiences while focusing on the joy and excitement of experimental knowledge. CCA is based on the idea that children originally have rich inborn sensitivities and limitless talents and capabilities.

To facilitate the CCA process, the teacher needs to prepare effective, attractive, and simple educational materials and bring enthusiasm and creativity to the classroom. As CCA draws upon children's interests, it naturally stimulates children to learn. Therefore, it is important that teachers clearly understand CCA's concept, utilization and effectiveness. Furthermore, teachers must be knowledgeable in child psychology including a child's desire, willingness, interests, and feelings. Teachers must understand children as broadly and as deeply as possible. Therefore, it is extremely necessary for teachers to build a strong relationship with parents and communities where children live, and to look carefully into various issues faced by children.



**Q1: What differences are there between conventional teaching and CCA?**

Conventional teaching in Myanmar is usually lecture-style focusing mainly on rote learning. A teacher stands in front of the blackboard and explains the contents of textbooks to children. Teachers usually speak constantly to children and children listen carefully to teachers. Children are forced to memorize information in the textbooks as well as what the teacher says. Children never ask teachers any questions because they are scared of teachers and are strictly trained to obey them. At the end of lessons, teachers usually check how much knowledge the children have memorized by using written tests or oral questions.

On the other hand, CCA focuses more on the children's performance. A teacher is not the main person but a mediator or a facilitator. Teachers encourage children to participate in lessons actively and to think deeply about the issues. During lessons, children usually work on activities and discuss their ideas and opinions with their friends. The teacher observes and evaluates their performance through the lessons. The teacher sometimes checks children's levels of knowledge and skills obtained during the lessons by using written tests. Unlike the conventional way, the score of a written test is only a small portion of the evaluation.

While the conventional way of teaching can be conducted even without good preparation, the CCA lessons require a large amount of time for preparation. Prior to lessons, teachers must always seriously consider that how to motivate children to study, how to make them understand the lessons, and how to evaluate their performance. The more time you spend for preparation, the better lessons you will have. In addition, CCA classes frequently require improvisations during lessons as teachers usually encourage children to express their ideas and opinions freely and they cannot predict what ideas the children will have. Depending upon children's ideas and opinions, teachers have to make some minor changes in the lesson plan promptly (Refer to the table of "*Comparison Between CCA and Conventional Approach*").



**Q2: Is CCA effective for children's education?**

Yes, CCA is an effective approach for children's education. First of all, let's think about why we give children education. All parents and teachers expect children to live a happy and rich life in the future. Children are usually protected from any social problems when they stay with their parents. However, once becoming independent, they have to deal with issues by themselves. In society, there are various problems and difficulties we have to tackle. Whether or not we live a happy life depends upon our knowledge and skills of how to deal with these problems and difficulties. We believe that children can obtain such knowledge and skills through education.

The conventional teaching method focuses mainly on memorizing facts in textbooks. Teachers force children to memorize and the children blindly obey them. In the short run, children's knowledge increases rapidly through this method. It can be good for preparation of examinations and interview tests. However, in the long run this method is not effective. Children easily forget such knowledge or they cannot apply it to different situations because they have only memorized it without understanding its meaning.

On the other hand, CCA lesson's aim is to develop children's deep understanding of issues. In CCA lessons, the teacher first motivates children to study by starting a lesson with children's experience and prior knowledge. The teacher then encourages the children to participate in the lesson through activities and discussions. During the lessons, children usually work actively. They think about the questions the teacher raises, discuss with friends, share their ideas, and find some answers. Children understand the real meaning of issues through these activities. Once they obtain knowledge in this way, they cannot forget it easily. They also can apply this knowledge to different situations. Although CCA requires much more time than the conventional way, it is one of the most effective approaches for education.

### Comparison Between CCA and Conventional Approach

		Child-Centered Approach (CCA)	Conventional Approach
			
<b>1</b>	<b>School Administration</b>	Headmaster is actively involved in children's education.	Headmaster strictly supervises teachers and children.
		Headmaster actively cooperates with teachers to create good teaching environment.	
		Teachers often share their ideas to create good lessons.	Teachers rarely share their opinions.
		School creates various facilities for children's education, such as flower garden, a place for raising small animals, etc.	N/A
<b>2</b>	<b>Learning Environment</b>	Classrooms are usually decorated with a variety of children's works.	Classrooms are plain.
		Classroom arrangement is changed based on the purpose of lessons.	Classroom arrangement is always lecture-style.
		Children are engaged in various activities such as observation, field-trip, group discussion, etc.	Children listen to teachers.
		Children are actively engaged in "doing," "imaging," "thinking," and "finding."	Children's learning attitude is always passive.
		There is frequent interaction b/w children and teacher.	There is only one-way communication from teacher to child.
<b>3</b>	<b>Teaching Materials</b>	Teaching materials are based on the teaching contents. Teachers create them by themselves.	There is no teaching materials or they are ready-made even if there are.
		Teaching materials are attractive and interesting for children.	There is no teaching materials or they lack attractiveness even if there are.
		Teaching materials have reality.	Teaching materials often lack reality.
		Teaching materials help children understand the contents.	It is not sure that teaching materials help children understand the contents.
<b>4</b>	<b>Teacher's Attitude</b>	Teachers create friendly relationships with children.	Teachers are always strict and scary.
		Teachers carefully observe individual child during the class.	Teachers do not pay much attention to individual child during the class.
		Teachers always encourage children to participate actively in the class.	Teachers require children only to answer to the questions.
		Teachers help children realize what they understood and what they did not understand.	Teachers announce children's rank among group by test score.
		Teachers create good lessons with children together.	Teachers follow only the instruction of textbooks.
<b>5</b>	<b>Support and Understanding of Outside School</b>	Support from parents is highly necessary.	N/A
		Support from community is highly necessary.	N/A



**Q3: Does CCA require many activities and teaching/learning materials?**

Many people tend to think that a teacher must prepare many activities (usually physical activities) in CCA lessons. This is not true. CCA is an approach that brings out the maximum capabilities in a child. If children's interests and expectations are carefully considered and if a lesson plan is well prepared, this lesson plan may be a CCA lesson. It is not necessarily important that lessons include physical activities or various teaching/learning materials. For instance, a teacher tells a story in the class and the children listen to it quietly. In this lesson, the teacher prepares no activities and no teaching/learning materials besides a story. This can also be a CCA lesson if the story is well prepared and considers children's interests and needs. On the other hand, a lesson including many physical activities and using many teaching/learning materials is not necessarily a CCA lesson. If these activities and materials are prepared without considering the children's level of understanding and interests, the lesson may make children confused. This is not a CCA lesson.

Generally speaking, CCA lessons use some appropriate activities and teaching/learning materials to help children learn. These activities and teaching/learning materials play an important role in the lessons. Therefore, when you make a CCA lesson plan, you have to think about what you will teach in a lesson, whether you need activities and teaching/learning materials, and what activities and teaching/learning materials can bring the highest effect for encouraging children's learning.

**Q4: Is it possible to implement CCA lessons in poor rural areas?**

Yes, it is. The CCA lessons can be conducted in any place and on any occasion if there is a teacher who fully understands the CCA concept. However, many teachers state that they cannot conduct CCA lessons because there are too few teachers and little or no budget to purchase materials for their schools. This belief is wrong. As mentioned in Question 3, CCA is not an approach requiring many materials. Nor is CCA an approach that is applicable only in particular conditions. Even though there is nothing in a school, CCA can still be practiced using a teacher's creative idea. For example, when a teacher teaches children the history of their village, the teacher starts by talking about the largest tree in the village: "You all know the big tree near Ko Mg Mg's house, don't you? That tree is the same age as our village. How many years ago do you think our village was established? Let's ask the tree about the age of our village." Then the teacher takes children to observe the tree and lets them measure its width. This lesson is truly a CCA lesson though it does not use any expensive materials. This lesson depends upon the creative ideas of the teacher.

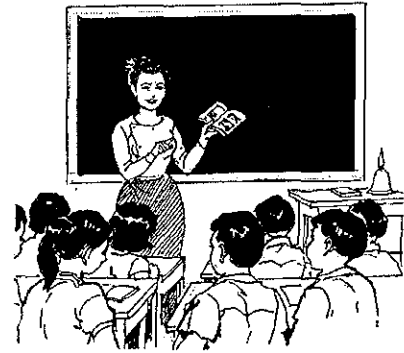
Another problem is that there are too few teachers in a school and there is no partition between classrooms. The teachers must take care of children of different ages at the same time. In this situation, you can practice the multi-grade teaching method. Multi-grade teaching is an effective teaching method when there are children of several different ages in one class. By using the multi-grade teaching method, teachers can deal with children effectively and can implement CCA lessons. However, multi-grade teaching requires special skills. Teachers who must take care of different aged children must gain these skills and techniques through some training courses. In the following, one example of multi-grade teaching practice is introduced:

All children, for example, from KG to G4 are engaged in the same topic together. At the beginning of the lesson, a teacher gives them one presentation by using picture-story telling, book-reading, and musical instruments. After the presentation, the children are given different tasks depending upon their grade. For children at KG, most simple and easy task such as expressing their ideas is prepared. For children at Grade 1, another task such as writing their opinions is prepared. For children at Grade 2, group discussion about the problems or issues in the presentation is prepared. For children at Grades 3 and 4, a task of finding some solutions by group discussion and presenting their ideas are prepared. Getting to know what other graders think and feel helps children understand each other mutually. This is also one of the most effective examples of CCA lesson in the case of the multi-grade teaching.

**Q5: Is it possible to implement CCA lessons in a class with a large number of children?**

Yes, it is. However, it is difficult to implement CCA lessons under this condition. Generally speaking, a class with a small number of children is better because the teacher can easily check each child's performance and level of understanding. On the other hand, a CCA lesson frequently fails in a class with many children because during some activities the teacher cannot control such a large number of children well.

Therefore, teachers have to carefully select teaching methods and learning activities when they conduct CCA lessons in a crowded classroom. For example, group work is one of the effective methods. A teacher gives topics to each group and encourages children's discussion. During the discussion, the teacher observes the groups and gives suggestions and hints if needed. After finishing the discussion, group leaders present their ideas and opinions.



**Q6: Can we use CCA in every lesson, such as Myanmar language, math and English?**

Yes, we can. CCA is not limited by subject or field of study. CCA is more like a rule regarding how a teacher acts and behaves in class and how a teacher deals with children. If you carefully consider what children want to know and what children are interested in, and if you create a lesson plan with your own unique and creative ideas, this lesson plan may be an interesting lesson. This lesson plan may also be a CCA lesson when you implement it effectively in class.

**Q7: Can we finish teaching all topics in the current textbooks when using CCA?**

Most teachers are concerned about this issue. Teachers are usually forced to finish teaching all topics by the end of the academic year. As you know, CCA takes more time than the conventional way of teaching. Therefore, you cannot cover all topics as long as current textbooks that are based on the conventional teaching style are being used. Thus, it is highly necessary to review the current topics, select the most important ones, and reorganize the contents of textbooks.

**Q8: Is CCA the same as “learning by doing”?**

CCA is not the same as “learning by doing.” There are a number of teaching methods which can be used when holding a CCA lesson and “learning by doing” is just one of them. However, it is true that “learning by doing” is one of the most basic methods of CCA.

The person who first practiced CCA was John Dewey, an American educator. At the end of the 19th century, he established an experimental school at the University of Chicago. Since he believed that children could learn things better through experience, Dewey made children at his school do various things by themselves. For instance, they wove cloth from cotton and wool and lived in a cave to experience the ancient way of life.

The present-day CCA is rooted in Dewey's experiments, whose essence was “learning by doing.” Thus, “learning by doing” remains one basic method of CCA, though it is not equivalent to CCA.

**Q9: What are the teacher's qualifications necessary for doing CCA?**

In Myanmar, rote learning has long been a common practice. Therefore, most Myanmar teachers do not know how to practice CCA. To practice CCA successfully, teachers should fully understand the concept of CCA and know a range of key techniques which can be used. However, this is not easy because CCA is a very broad concept using numerous techniques. As a matter of fact, one hundred teachers would practice CCA in as many different ways. If you can use one CCA method, it does not mean that you can conduct the full range of CCA methods. Thus, it generally takes time for a beginner to fully understand the concept of CCA and become familiar with the methods. The only way to accomplish this is to practice it many times.

Although it takes a long time, to become a CCA practitioner does not require any special qualifications. The first qualification is that you enjoy giving lessons. If you like to give lessons and when you realize a change in children's facial expression during your class, you are standing at the bottom of the CCA ladder.

The second qualification is that you be concerned about children. What do they think about? What are they interested in? What do they want to know? If you try to understand children better, you are standing on the

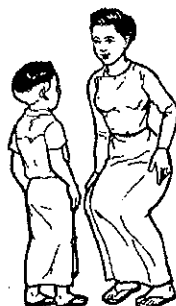
first step of the ladder. The third qualification is for you to be able to analyze how to make children interested in the topics to be taught. If you can do this, you have climbed up to the second step.

The fourth qualification is imagination and creativity. You have to try to create an interesting lesson using your imagination. After completing your lesson plan, review it again and again. Imagination and creativity are the keys to interesting lessons. The fifth qualification is the ability to act like an actor or actress. In the classroom, you should be aware of eye contact, tone of voice and rhythm, and gestures. You should be able to make various expressions like an actor or actress on stage. When you satisfy all the qualifications above, you have reached the fourth step of the ladder. The top is not so far from there.

### Teacher's Various Attitude



Kindly taking to children



Carefully listening to children



Humorously explaining to children

### Q10: How do we let parents know about CCA?

It is very important to teachers that parents understand what is being taught to children at school. Without parents' understanding and cooperation, education will not be successful. One way of letting parents know what children do at school is to set up an open-school day. On such a day, parents can visit the school and observe school activities. Another way is setting up a meeting with parents in which they discuss any issues concerned with the children. Such a meeting will help parents better understand their children's school performance. Still another way is for teachers to visit children's homes to observe their daily life. This is a very effective way to share information between parents and teachers. The important thing is to contact parents frequently and share as much information as possible with them.

## Designing CCA Lessons

Planning is a base for implementation. Good plans make implementation better and easier. How much time did you spend on planning is related to how successful implementation is. CCA implementation is also the same. Applying CCA in your class starts from designing lesson plans. If you make a good lesson plan, your lesson will be more interesting, understandable and attractive to the children. Whether it is a good CCA lesson or not depends on lesson plans. To make a good lesson plan, the teacher has to know several key issues and steps for planning. In this Teacher's Guide, lesson plans are introduced, but the teacher must modify them with considering their own teaching environment to implement effective CCA. The following is the key information necessary for teachers to create a good lesson plan.

### **STEP 1: Let's review the learning objectives of the topic**

First of all, look at the objectives of the topic you are going to teach. The objectives are a guideline as to why you teach this particular topic. All contents regarding the topic should be prepared to achieve the objectives. There are two kinds of objectives: general objectives and specific objectives. General objectives indicate the goal to achieve during the lessons on the topic. Specific objectives are the goal for each lesson. You should review these objectives carefully and understand the goal is in a particular topic and what kinds of information needs to be taught. Then, try to imagine the entire lesson in your head.

### **STEP 2: Let's think about related issues of the topic**

Based on your image of the lesson, think about what issues will be related to the study of this topic. In this step, you can randomly write down your ideas. Any issues coming to your mind should be written. Think about what information you want to know if you are given a particular topic. For example, if the topic is "Our village," "What do you want to know through the study of this topic?" It may be "How many people are there in our village?" or "When was it established?" or "How many TV sets are in our village?" and so forth.

### **STEP 3: Let's select important issues to teach**

The issues picked up at step 2 are carefully reviewed in consideration with the objectives. Then, some important issues are selected as teaching/learning issues. In this selecting step, you should make sure that these issues cover all the objectives. If the selected issues do not cover all the objectives, you should add more issues to supplement it.

### **STEP 4: Let's consider applicable and effective teaching methods**

In this step, spend time to consider how to teach each issue selected in step 2. In CCA, this part is significantly important and is worth spending more time on "How do we teach so that children can easily understand?", "Do we need some activities to increase children's motivation?", "What activities can work well in teaching this issue?" You can take several methods and activities to teach the issues, such as group discussion, peer work, drawing pictures, presentation and so forth.

### **STEP 5: Let's create lesson structure**

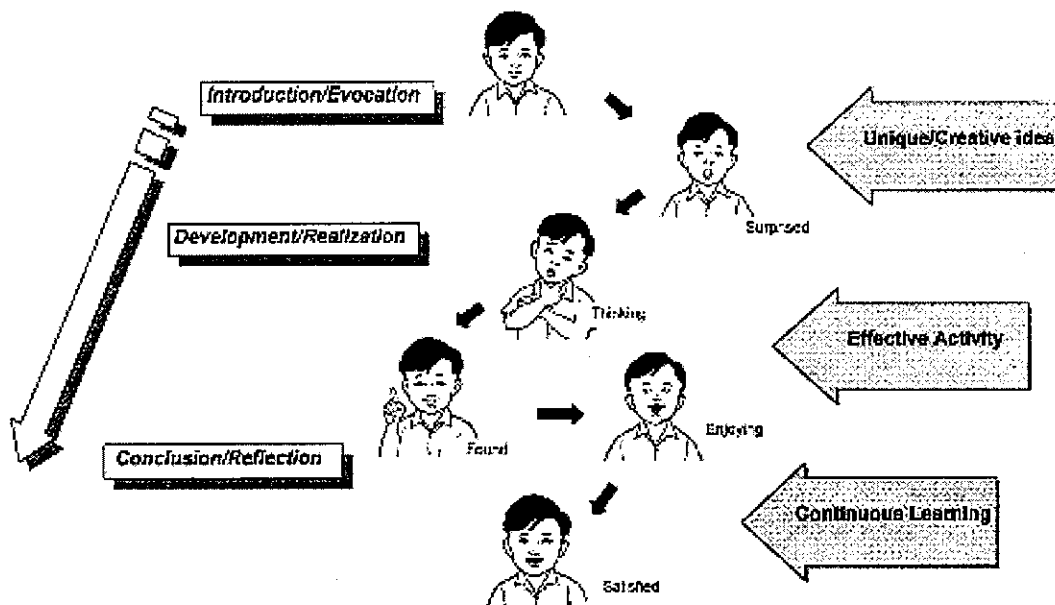
In this step, think about a particular lesson plan which will be conducted in the classroom. You can choose some issues selected at step 3 and arrange them within the particular timeframe, usually 30 minutes for KG, G1 and G2, and 35 minutes for G3 and G4. In this step, consider how many issues you can teach during one period and in what they should be taught in.

You can usually divide one lesson into three part; *introduction*, *body (or development)*, and *conclusion*. The first part, *introduction*, plays an important role to motivate children to study a new topic. You should prepare this part well to stimulate children's motivation. For example, if you prepare something surprising, children's interests will peak and the whole lesson can be done smoothly.

The second part of *body (or development)* is the main part of the lesson. In this part, you can teach the important issues you want to give children. To promote children's understanding of the issues, it is better to plan some activities in the lesson. These activities aim to stimulate children's understanding. Therefore, don't do activities randomly. They need to be thought out carefully.

The last part, *conclusion*, is a summary. It is also used to link the current lesson with the next lesson. Specifically, you can review the issues with children, ask them their opinions about the issues, and preview the next issues to be taught.

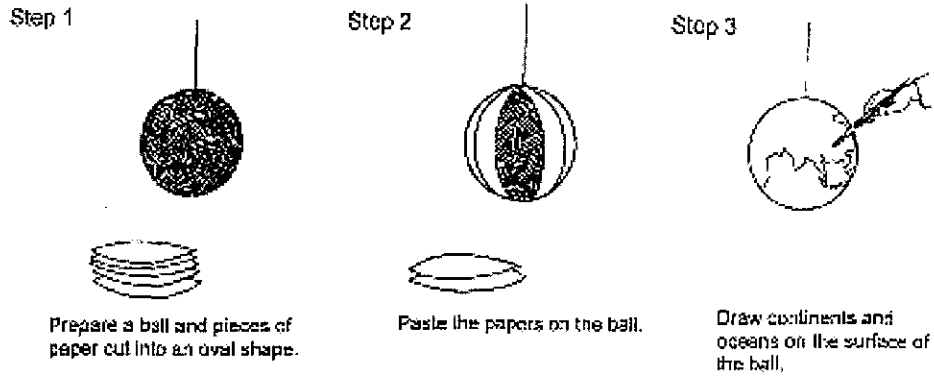
In ideal CCA lesson, children's facial expression will change within one lesson. At the beginning, children are still nervous. However, children's apprehension will be broken by your surprising introduction. Children are then relaxed and can concentrate. Activities can help keep children's motivation high. During the activities, you can observe children's happy expression in your classroom. At the end of the lesson, children will hopefully have a look of satisfaction on their faces.



### STEP 6: Let's prepare teaching / learning materials

The next step is the preparation of teaching / learning materials. Based on steps 3 and 4, you already know what kinds of teaching / learning materials are needed. Based on this information, you can prepare them. Some of them will be bought and the others can be made by the teacher. Especially in rural areas, teachers should prepare them by themselves instead of purchasing them. You do not necessarily have to create sophisticated materials, but simple ones by using local materials around you.

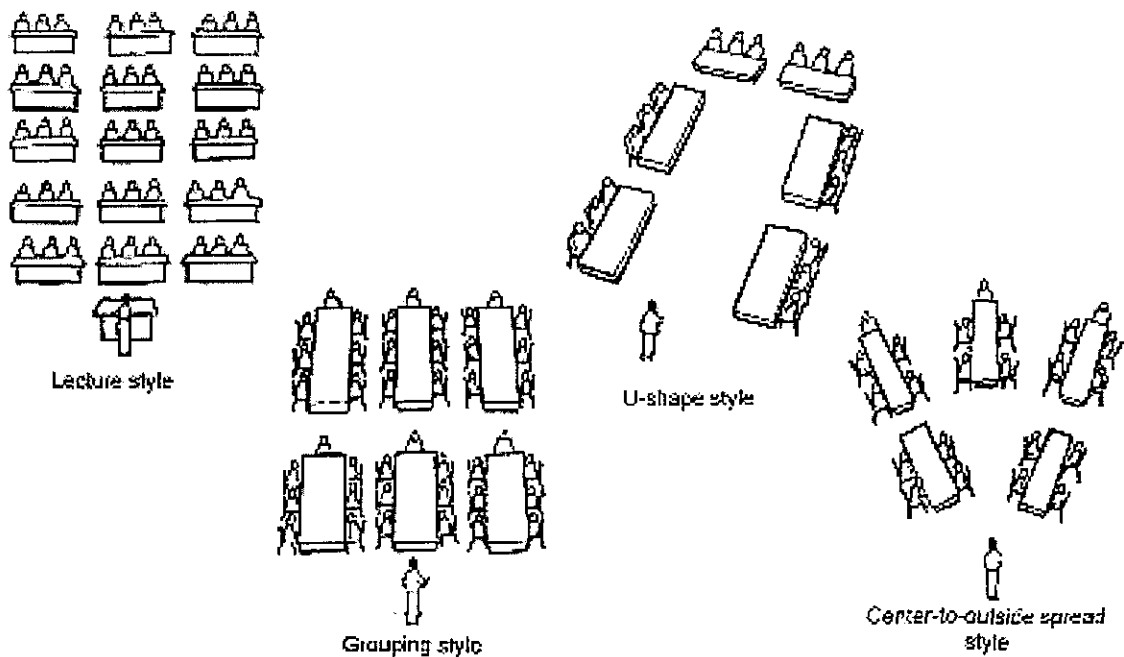
For example, when you need a globe, you do not necessarily have to spend a large amount of money. You can make it cheaply and easily by yourself. Please look at the illustration. Prepare a ball and several pieces of paper cut into an oval shape. Then paste the papers on the surface of the ball. After pasting, wait until it becomes dry. Finally draw some continents and oceans on the surface of the ball. It becomes a good globe.



**STEP 7: Let's think about effective classroom arrangement**

The final step is to arrange the most appropriate and effective classroom setting. Each lesson usually prepares different activities. Each activity also requires different classroom arrangement to bring about children's best performance and the most effective lesson. Based on the learning activities you prepared, you can arrange the most effective classroom arrangement.

For example, there are many group activities in your lesson such as group discussion, group observation, group work and group presentation. Therefore, grouping the tables may be the best arrangement. When you show some picture stories or video in your lesson, the U-shape arrangement may be the best. If both activities, group work and showing videos, are used in one lesson, you can use the center-to-outside arrangement.



## Assessment for CCA

### What do we expect children through CCA?

First of all, the following two cases are introduced. One is the case of CCA class and another is the case of the conventional class. Which class is CCA and which class is the conventional class?

#### **Case 1:**

*English, maths and mother-tongue lessons are taught through activity, play, experimentation and discovery. A girl at the kindergarten level takes her pet turtle and toys to school to show and tell her friends about them. Kids were encouraged to interact and ask questions. Worksheets (or assignments) were combined with activities, such as using rice to form letters. Teachers are not big on neatness. Under such a learning environment, she enjoys school very much. "She is a very confident girl and not afraid to speak to adults. She is relaxed about school and uninhibited about asking when she does not understand something," says her mother.*

#### **Case 2:**

*English, maths and mother-tongue are taught separately. Teacher stands in front of the class, giving instructions. There are plenty of worksheets, and lots of homework, especially spelling. Children are praised for keeping quiet and turning in neat work. Under this learning environment, a girl is not enthusiastic about school, and fear going if she doesn't finish her homework. "She was very outspoken before pre-school but she gradually toned down and became less curious and talkative," said her mother.*

These two cases were conducted in Singapore to improve education for children. Some schools were designated as experimental school under the educational improvement project, and others were designated as control school. *Case 1* is the scenery of one of the experimental schools and *Case 2* is the scenery of the control school. As you know, *Case 1* is CCA class and *Case 2* is the conventional class ("The Strait Times").

The base of CCA is children's interest and experiences. Through the lessons that are based on this CCA base, children become interested in learning and actively participate in classes. Children use their five senses at maximum and tackle with the issues in the classes. In this learning process, children can fully develop their thinking ability and creativity with deeper understanding of the issues. Unlike the conventional approach, CCA focuses on not only children's level of knowledge and understanding, but also their positive attitude and strong interest in learning. Therefore, CCA creates children who are active, curious, and positive towards learning and their life. This is significantly important for human being in the long run. We should think again whether a child who is not interested in learning and is less active in spite of much knowledge can become a good citizen. In this respect, CCA concerns about the foundation and the basis of education.

### How do we assess children?

Besides level of knowledge, teachers must focus on children's interest and attitude towards classes. To do this, the teachers are required to use various ways of assessment, such as writing tests, questionnaires, essay reports, interviews, observations, etc. These ways of assessment can check different items achieved by children. For example, writing test can check children's level of knowledge, or "how much did children understand?" Questionnaire is good for checking children's interest or "How do children devote themselves to something?" Essay report is very useful for knowing children's attitude or "How do children think about and feel about?" Therefore, the teachers must use these different ways of assessment and assess children's achievement in the comprehensive manner. In addition, another important point is that teachers must recognize the real purpose of the assessment. Why do we assess children? All teachers must think about this question again and must have the common recognition of the assessment. Currently, the result of assessment is used for ranking children and comparing each other by score. As a result, children have become afraid of and hated assessment tests. This

may have discouraged them to learn more and to try new things. Instead of these traditional ideas, the assessment for CCA must encourage children and promote them to learn more. In CCA, the result of assessment must be used for feedback to children. In other words, children know what they accomplished and what they did not through the assessment. By recognizing their accomplishment clearly, children can find the right direction of their studying.

Moreover, all teachers must know the following point. The assessment is conducted both by children and teachers. In the traditional thought, the assessment has always been conducted by teachers and given children the result from teachers. This assessment is only one-way assessment: from teachers to children. But the assessment of CCA is conducted by the two parties. Teachers directly assess children's performance by using various different assessment methods (*the assessment from teacher to children*). At the same time, teachers also realize whether their teaching process was good by the result of assessment. If the children's level of accomplishment had been less than teacher's expectation, the teaching process might not have been effective nor appropriate. The teachers should revise their teaching process (*the assessment from children to teacher*).

### **What kinds of assessment can teachers use?**

There are many different kinds of assessment methods. Teachers can use a variety of assessment methods, depending upon the purpose of assessment. Currently most teachers rely highly on writing test method. However, this method can cover only children's knowledge level, it cannot check children's attitude and interest. In the following, the necessary assessment methods for CCA are introduced:

#### ● **Observation**

The observation method is one of the most important assessment methods for CCA. Because CCA pays much attention to improvement of children's attitude towards learning and to reinforcement of their interest in learning, this method is effective and appropriate to check it. However, teachers must establish the criteria prior to observation. The major points to check are the following:

1. *How have children's attitude and behavior changed?*
2. *How have children's interest in learning been strengthened?*
3. *How have children participated in lessons?*

In addition, the result of assessment done by the observation method must be given back to children immediately to help children recognize their learning situations.

#### ● **Self-assessment and Peer-assessment**

Although observation is effective assessment method, a teacher has a limitation to observe each child in detail. To supplement teacher's observation, it is significantly useful to let children review their own performance by themselves and to let children evaluate their friend's performance each other. Practically, there are several ways for this assessment, self (or peer)-scoring, self (or peer)-describing, self (or peer)-evaluation sheet, checklist, and questionnaire. Note that it is the requisites for establishing a good relationship among classmates when the peer-assessment is used.

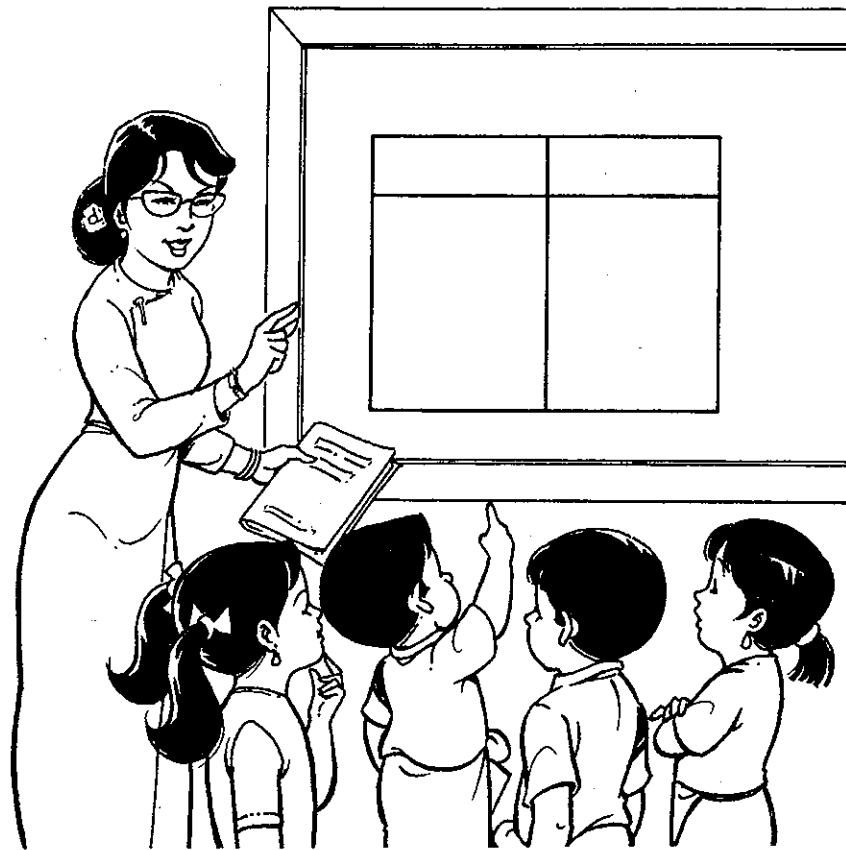
#### ● **Interview method**

This method is also useful to know children's way of thinking and feeling. This is the assessment based on the result that teachers interview with children, sometimes including parents. Although it takes a lot of time, teachers can know the details of children's feeling and behavior through direct communication. However, this method highly requires good relationships between teachers and children to collect reliable information. Therefore, teachers make their best efforts to create good environment during interview.



# Basic Science

## Note to Teachers



## Basic Science Subject outline

### Basic Science- General Objective

This Teachers Guide is written with the objective as follows. It is particularly important for teachers to always keep these objectives in mind and help children to learn accordingly.

General objectives of Basic Science at the Primary Level are

1. To develop interest in the natural processes and desire to observe and study them.
2. To be aware of the benefits of natural resources and to exploit them for our daily life.
3. To appreciate the environment and know how to safe-guard and maintain it.
4. To live according to personal hygiene and family health knowledge.
5. To know the importance of science to increase productivity.

### Strands in Basic Science

The topics are divided into four major parts;

Living Things; (2) Matter; (3) Energy and (4) The Earth and Space.

The four major parts need not be taught in this order. It is for the teachers to decide the sequence of the lessons appropriately to the daily conditions of the surroundings. For instance, the lesson on weather conditions may be chosen for a season with observable weather changes.

### Grade wise objectives

Students are expected to be

1. Interested in science with connecting it to daily life, their knowledge and experiences
2. Capable in scientific thinking which is for prediction, comparison, relevance, investigation, analysis with data on graphs, and imagination
3. Skilful and technical in doing experiments, observing, measuring, recording, presenting and drawing diagrams and graphs.
4. Capable in understanding basic science concepts of topics.

Living things:

Children understand the ability of plants to manufacture their own food, feeding of animals, grooming of animals, benefits from animals, domestic and wild plants, specific structure of plants, functions of parts of plants, and benefits from plants.

Matter:

Children understand measurement of the weight and volume of solids and liquid and expansion and contraction of matter.

**Energy:**

Children understand different sources of lights, travels of light in a straight line, formation of shadow, a complete electric circuit, conductors & insulators, various force, cause of motion, and regular and irregular motion.

**Earth and Space:**

Children understand measurement of temperature, temperature graph, soil erosion and its causes, rotation of earth, and the orbit of the moon and earth.

**Selecting concepts**

To achieve the general objective above, the key concepts are selected comprehensively in Basic Science as following criteria:

1. Helping to learn basic and universal scientific principals and theories systematically.
2. Helping to develop the scientific thinking
3. Helping to learn basic knowledge related to real life
4. Helping to learn the role of science related to human society (Including historical aspect of science)

**Strategies to be used**

1. Collect data and describe what they have found out.
2. Report on investigations and answer straightforward questions.
3. Classify animals and plants in different ways
4. Take accurate readings from instruments
5. Record data that accurately reflects observations
6. Take into account safety issues
7. Choose different forms of presentation
8. Propose and discuss steps in an investigation.
9. Observe and describe changes in materials
10. Report on investigations and identify certain procedures.
11. Record different observations and results
12. Listen to and reflect opinions of others.

## Basic Science and CCA

**How can we make Basic Science lessons more attractive for children?**

1. Choose carefully topics/contents that are suitable to children's interest and their reality.
2. Clarify concepts well to teach firstly so that children can understand the principal of the science easily.
3. Choose good teaching/learning material for example
  - Real Material
  - Making fun sort material
  - Good accurate pictures, models
4. Select good methodology
  - More experiments/Demonstration
  - More out-of-classroom (field) activities
  - More projects type of activities
  - Story telling (good books concerning science)
  - Doing by themselves
  - Group work
5. Make classroom open (let people know what is going on in classroom) and have good relation with school administration, parents and community to get their understanding easily. Parents and community can also participate into science education as resource parson and/or assistance for teaching even in classroom level

**Process-based learning**

CCA lessons of Basic Science is based on four types of activities; Experiments, Observations, Image Making and Handiworks.

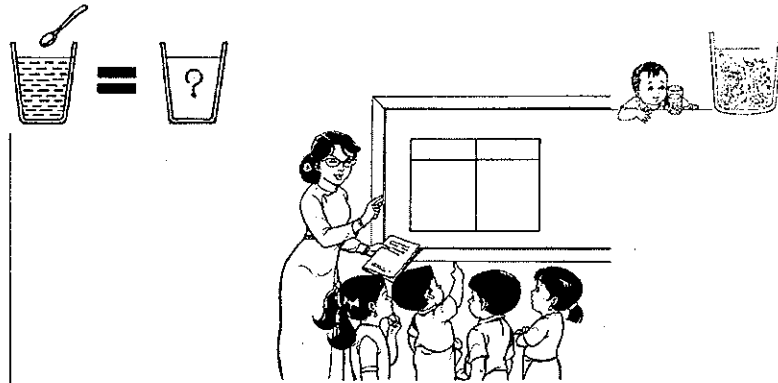
**Experiments and observations**

Experiments and observations are essential activities in Basic Science lessons. It is important to understand the meaning of experiments and observations then you can make more effective learning activities for children.

Experiment is a type of activity to create certain condition to observe 'Rules and theories of nature'. Observation means to see 'phenomenon in nature' with concrete purpose, therefore merely 'seeing' is not observation. You have to make children aware 'what we like to see' (it is different from 'knowing result ahead' for example children must be aware for observation of the moon that they need to see the movement of the moon but not necessarily to know the moon moves from east to west for observation) for observation.

Experiments and observation should be started on children's predictions about 'What will happen'. Children can find the answer through experiment and observation, not by merely memorizing from the books or what teachers say. Teachers should always ask children their prediction before an experiment and observation. It is also recommended that children discuss their prediction and the reason why they think so among

them. Discussion will develop children's skill of expression and communication. At the same time, they will learn to listen to each other and respect others.

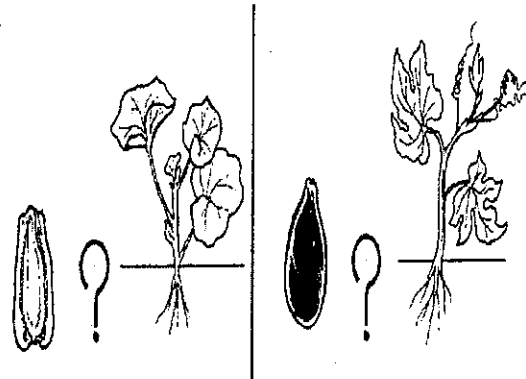


Through this process (Prediction, Discussion, Experiments), children can develop 'scientific thinking/ logical thinking'.

### Observation of living things

The study of 'Living thing' takes more time, because change of living things cannot be observed within a few days. Therefore you should give good guidelines for children on 'when to observe' and 'what to observe'. You should also help children to find change over a longer period of time because children may forget the previous condition of the subjects and not realize the change. Therefore it is essential for children to keep records on the 'observation sheet'. It is also important to mention what lead this change or why this change happened. You should lead children to find changes associated with time and seasons.

Since 'Living things' topic requires long period to observe, you needs to plan lessons well. It is recommended to conduct 'living things' lessons in-between other topics so that each lesson of these topics is conducted with an enough interval.



## Image making

Some topics as 'The Earth, the Moon and the Sun' will require making an image when children cannot observe the real condition directly. Good models, story telling and tasks to make images are good methods to be used. This Teacher's Guide introduces activities using some models, stories and examples to make very correct images of the subjects.



Ask children;

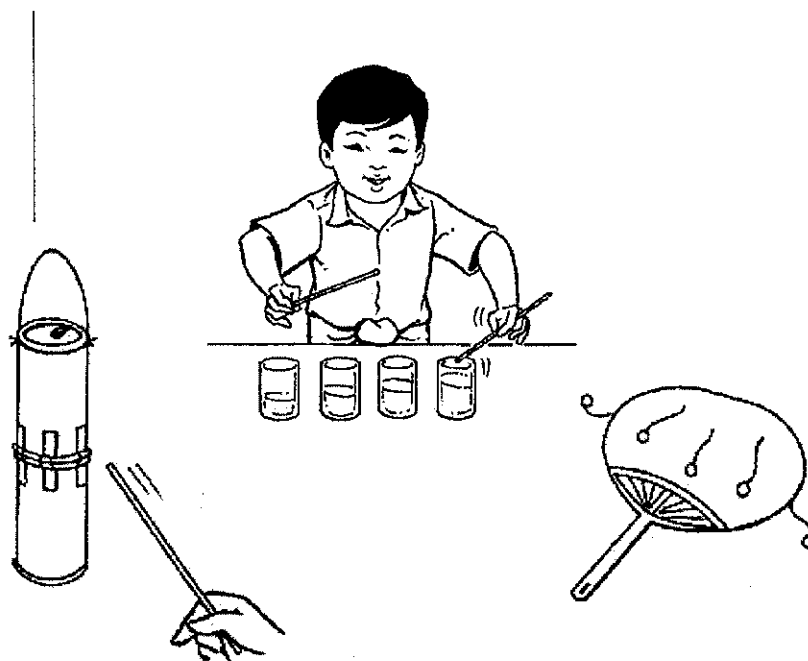
Our walking speed is 2.5 miles per hour. If you walked around earth with this speed, how long would it take?

Let children choose from following answer

- a. 1-2 months
- b. 3 years
- c. 10 years

## Handiwork

Through handiwork, children can also learn very basic science principals. For example, through making some music instruments, children will find how sound is made and what makes high pitch (high tone) and low pitch (low tone). Moreover handiwork is very enjoyable for children. This Teacher's Guide introduces some examples of handiwork activities and it is recommended for you to develop their own ideas of using locally available low-cost materials as much as possible



## Communication

It is very important for children to develop communication skill. In Basic Science lessons, children are encouraged to express their predictions and findings and discuss within groups and a class. For these practices, you must have clear theme and guidance so that children will more easily know what they need to consider. Experiments, observations and even story telling are excellent occasions for discussion and development of communication skill.

**THIS TEACHER'S GUIDE**

**TEXTBOOK**

CHAPTER 1: LIVING THINGS

Topic 1: Different type of living things-----  
Topic 2: Animals-----  
Topic 3: Plants-----

CHAPTER 1: LIVING THINGS

Topic 1: Different type of living things  
Topic 2: Animals  
Topic 3: Plants

CHAPTER 2: MATTERS

Topic 4: Matters in environment-----  
Topic 5: Properties of matters-----

CHAPTER 2: MATTERS

Topic 4: Different forms of matters  
Topic 5: Pre-heating and post-heating condition of matter

CHAPTER 3: ENERGY

Topic 6: Light-----  
Topic 7: Electricity-----  
Topic 8: Motion-----

CHAPTER 3: ENERGY

Topic 8: Linear motion of light and shadow formation (G3 & G4)  
Topic 9: Magnetism and electricity (G3 & G4)  
Topic 10: Motion (G3 & G4)

*In the teacher's guide, magnetism from G4 was shifted to G3 and the electricity was shifted from G3 to G4.*

*'Topic 6: Heat' and 'Topic 7 Sound transmission and hearing' were shifted to G4*

CHAPTER 4: THE EARTH AND SPACE

Topic 9: Weather-----  
Topic 10: Erosion-----  
Topic 11: The Earth, the Moon and the Sun-----

CHAPTER 4: THE EARTH AND SPACE

Topic 11: Weather (G3 & G4)  
Topic 12: Causes of soil erosion  
Topic 13: The Earth, the Moon and the Sun (G3 & G4)

*Studying of temperature was shifted from G3 and cycle of water was shifted to G3 in topic 11, weather.*





# Grade 4

## Chapter 1 Living things



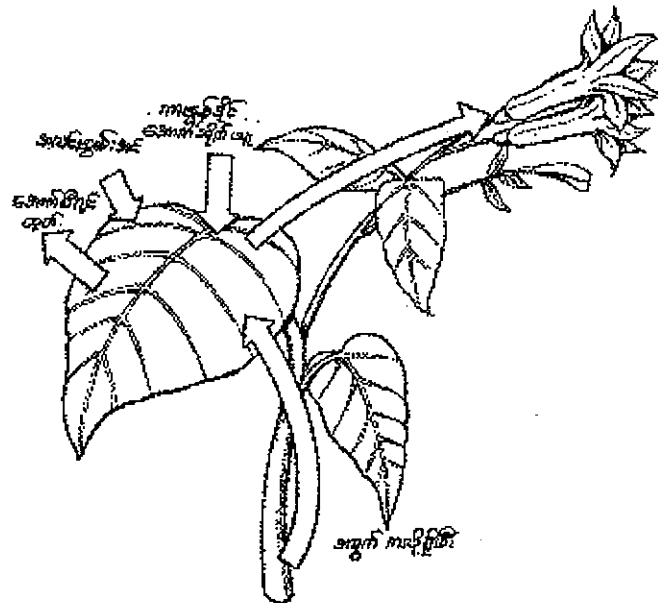
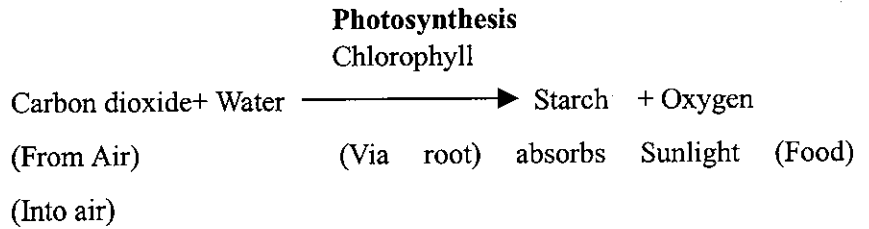
**Topic 1: Different type of living things**

<b>1. Key concept</b>	Plants and animals are differentiated by their food taking
	All living things are characterized by food taking, growing, excreting, respiring and reproducing.
<b>2. Learning objective</b>	
<b>General</b>	1) Be able to describe that all green plants have the ability to manufacture their own food.
	2) Be able to describe that animals feed on other organisms and plants, as they are not able to manufacture their own food.
	3) Be able to observe and discuss the characteristics of living things
<b>Specific</b>	1) To be able to express daily activities from their experience
	2) To be able to notice feeding process,
	3) To be able to distinguish animal and plants motives of nutrition for human being
	4) To be able to notice the condition of photosynthesis
	5) Be able to describe the characteristics of living things, such as eating food, growth, reproduction, locomotion, response and having cell structure
<b>3. Activities involved</b>	Observation
	Discussion
	Thinking with pictures
	Presentation
<b>4. Activity purpose</b>	For children to understand what is necessary for Living things through activities
	To be able to think scientifically from imagination the life processes by putting one's body as an example.
	To make students understand easily the information on having cell structure by drawing and story telling method.

**Before Getting Started**

<b>Self-check list for Teachers</b>	<input type="checkbox"/> Do I know about plants food processing different from animal?
	<input type="checkbox"/> Am I clear about photosynthesis process?
	<input type="checkbox"/> Can I prepare teaching/learning materials appropriate for children's learning?
	<input type="checkbox"/> Have I collected any effective information for children to present each characteristic of living things.
<b>Background information for teachers</b>	
<b>Plants food-making process</b>	Apart from some bacteria, plants are the only living things able to make their own food. Tiny grasses and huge trees share the same structure for the food making process. All plants need light, because they use

energy from sunlight to make their food. They need water and minerals, which most plants obtain through leaves and roots. Plants also differ from animal in that they contain a green pigment called chlorophyll. This enables the plants to make their own food with the aid of sunlight. Only plants and some bacteria can perform this chemical trick.



Plants capture light energy from the sun and use it to make food in a process called photosynthesis. Inside the leaves, the gas carbon dioxide is combined with water to make sugars and a substance called starch. The gas oxygen is produced and released back into the air. Glucose molecules are joined together into long chains. One chain is called cellulose, which is used for growth and body-building, and the other is starch, which is used as a reserve food store. Plants also make amino acids for protein, enzymes and hormones. The plant uses glucose as fuel to make energy, in a process called respiration. Glucose molecules are joined together into long chains. One chain is called cellulose, which is used for growth and body-building, and the other is starch, which is used as a reserve food store.

**Difference between Plants and Animals**

Plants also differ from animal cells in that they contain a green pigment called chlorophyll. This enables the plants to make their own food with the aid of sunlight. Only plants and some bacteria can perform this chemical trick. There are many cells in each plant, and each group of cells has its own tasks. The main body parts of a plant are roots, stem, leaves and flowers.

To reproduce, many plants have flowers that make seeds. But plants have other means of reproducing too for example, the strawberry sends out runners. All plants are made of cells. Plant cells differ from animal cells in that they absorb water and grow larger and stiffer as the plant ages. This is why young vegetables are tender to eat than old ones. Plant cells build thick walls made of cellulose. Each cell is stuck firmly to the walls of neighboring cells.

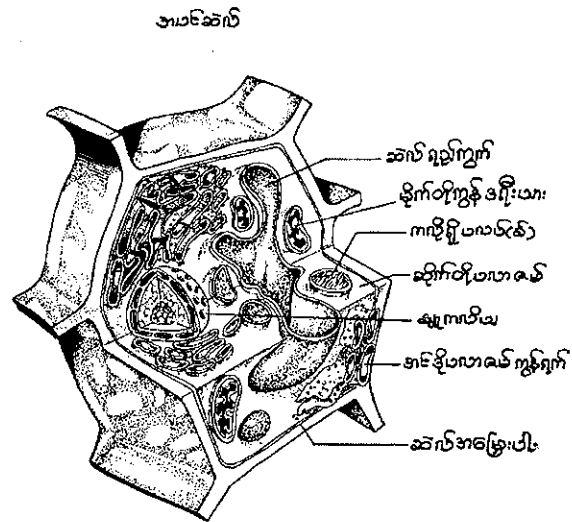
**What is a 'Cell'?**

A tiny unit of living matter. Cells are the building blocks of all living things. Cells reproduce by dividing in two. Essentially, they consist of many molecules working together under the control of DNA – the key molecule, containing the information needed to make them work. – and protected within a fatty membrane. Eggs are 'one cell' units.

The cell in both plants and animals have the same basic structure and organization. They consist of a blob of jelly is called cytoplasm contains several different parts, or organelles. They include a single nucleus, many mitochondria and a network called endoplasmic reticulum. The nucleus is the cell's information control center, and the mitochondria produce energy.

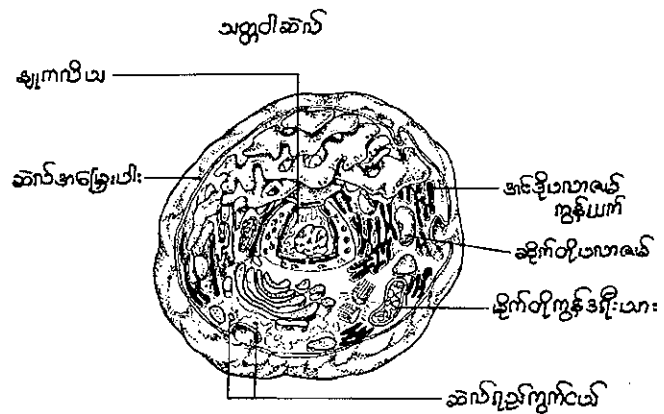
**Plants cell**

There are several basic differences between plants and animal cells. Plants cells have an additional cell wall outside the membrane. It is made of a tough substance called cellulose. The rigid walls protect and support the cells and give them their shape. Inside a plant cell there is usually a large space, called a vacuole. It is filled with a sugary liquid known as cell sap. Inside the cells in the green parts of plants there are chloroplasts. They contain the green pigment chlorophyll. Chloroplasts enables plans to use the energy of the sunlight to make food, and to store it as starch.



**Animal cell**

Animal cells do not have chloroplasts or a rigid cell wall. The outer membrane comes into direct contact with adjacent cells. The vacuoles in animal cells are much smaller than in plant cells. Animal cytoplasm contains folded membranes and threads of protein.



**Carnivore, Herbivore and Omnivore**

Animals who eat only plants are called Herbivore.  
 Animals who eat only meat are called Carnivore.  
 Animals who eat plants and meat are called Omnivore.

**What is 'living things'**

Living things mean that they eat food, grow, reproduce, response to impact and forming cells.

**Lesson Planner**

Suggested period (8)	Period 1, 2 and 3	Period 5	Period 6	Period 4 7 8
<b>Lesson topic</b>	Plant produces own foods	Foods animals eat	Characteristics of living things	<b>Assessment/ Review</b>
<b>Sample lesson plan</b>	1-1,1-2	1-3	1-4	
<b>Specific objective</b>	Be able to describe that animals feed on other animals and plants, as they are not able to manufacture their own food. Be able to describe that plants have the ability to produce their own food	Be able to identify the animals if they are either herbivores or carnivores or omnivores	Be able to describe the characteristics of living things such as eating food, growth, reproduction, locomotion, response and forming cells.	
<b>Introduction (Motivation/Create interest/Active prior knowledge)</b>	Have the children think and describe one's daily routines	Have the children describe the food they have ever eaten.	Let them present the names of living things and non-living things around one's environment.	
<b>Core/Development (Active engagement with test/task)</b>	Plants carry out the things for their survival like animals. Experiment for the engagement with text  Supplement more information regarding text in the topic Activity 2, 3, 4	Teacher has to give help to be able to match the animal and its food correctly	To be evident in each characteristic of living things let the students portray by relating with the activities that one's body can perform. With the help and guidance of the teacher students can get effective relationships.	
<b>Assessment points</b>	Motivation of Interest/Attitude Do children participate in learning process? Do they get the concept of experiment? Is the guessing of children concerned with the objectives correct? Scientific thinking Are they able to conclude the experiment? Are they able to know the real process and achieve the scientific thinking?	Are the children able to find out correctly what kind of food other animals eat and how many groups are specified in accordance with their food based on the food one has ever eaten? Are they able to participate in the discussion on issues? Are they able to think logically?	- Do the students participate in group discussions? - Do they really think and bring out the processes that happen in one's body? - Do they really specify and bring out the characteristics of living things?	

*Topic1: Different types of living things*

<b>Adaptation curriculum</b>	<b>of</b> Plants are used in this topic. Find out and collect information regarding the opportunity for the plant to survive. Any portraying method, which is appropriate with the lesson, can be used in order for the students to be able to present the characteristics of living things in reality.
------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



**Activity 1 We are all born**

**Teaching/learning material**

---

**Concept**      Reproduction of animals

---

Teacher asks children  
'How are you here in this world?'

Children may answer they are born.

Teacher asks,  
'How about other animals, do all animal born from their parents?'

Teacher tells children they are all born from parents and those children will be again parents.  
This is reproduction process.

Teacher asks children,  
'Do you remember grade 3 when we grew plants and get seeds?  
We can again plant these seeds. Plants have also reproduction process.'

Teacher tells children all living things have process of reproduction.

## Activity 2 Write your daily activities

### Teaching/learning material

---

<b>Concept</b>	Animals do not produce their own food therefore they eat plants or other animals, while plants produce their own food
----------------	-----------------------------------------------------------------------------------------------------------------------

---

1. Teacher asks children  
'Write down your daily activities'

Children write down all activities they do from waking up till going to sleep. 'Eating breakfast', 'going to toilet' 'going to school' etc. (Children can miss 'breathing' easily, at this point NO PROBLEM)

2. Teacher asks children  
'Can you stop your breathing for a while?'
- Children stop to breath for a while, but soon find out it is not possible to stop.

After 1, 2 children will find what are essential to live.

'Eating (energy consumption)', 'Going to toilets (Excretion)', 'Breathing (respiration)'.  
It is not necessary to mention these academic words yet.

3. Teacher asks children  
'How about other animals (for example, dogs, cats etc). What they do during they are awake?'

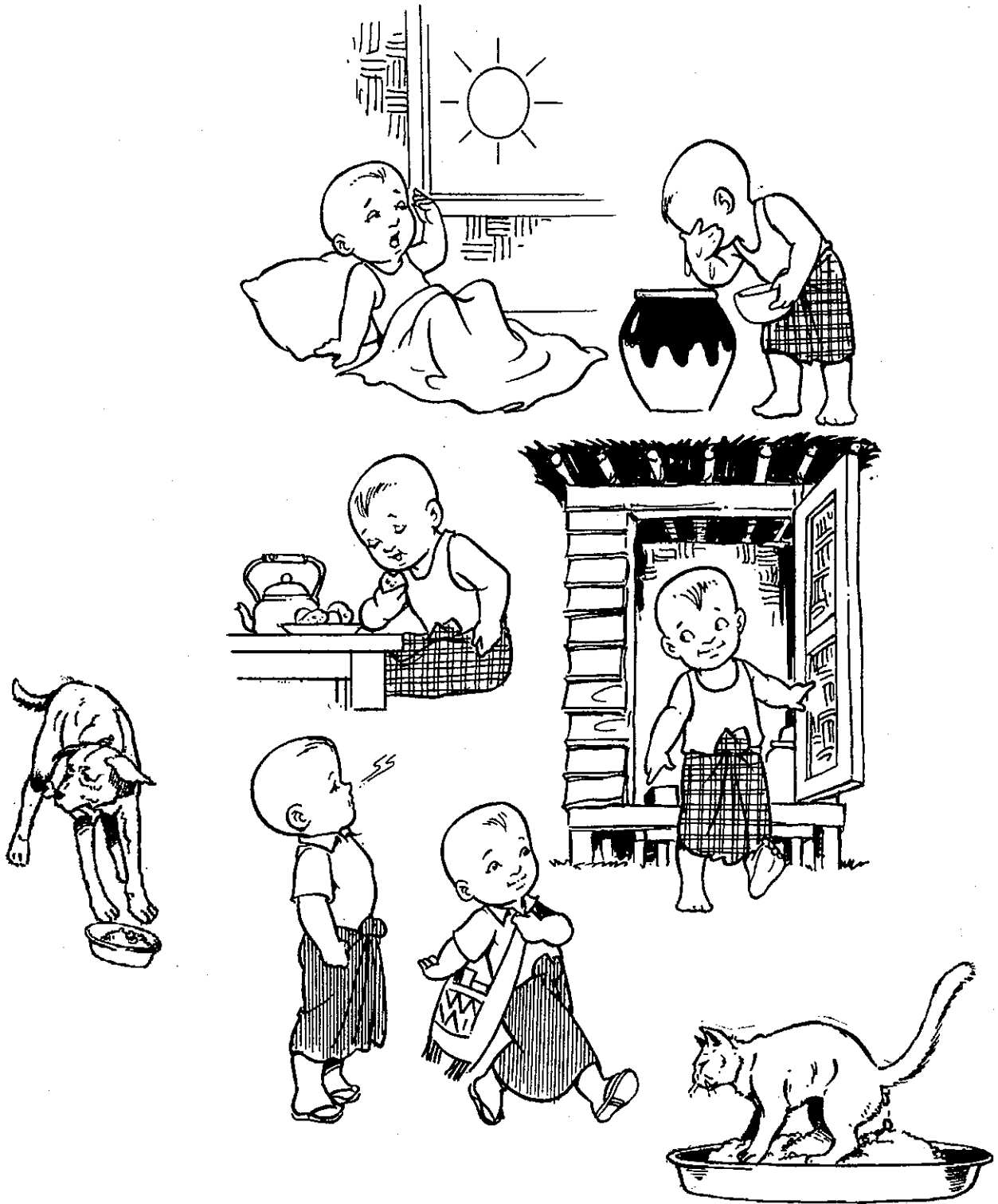
(Teacher let children to understand animals have same essential activities as human being)

4. Teacher asks children  
'How about plants? Do they need to eat?'

(Teacher let children know eating is not essential for plants)

5. Teacher asks children;  
'Why do you think plants do not need to move, while animals move around?'

Children may answer plants do not need to find food (they can produce by themselves).



This Activity can be during 'Plants' lesson for using 'seedling'

**Activity 3 What plants need 1**

**Teaching/learning material**

Two identical plants

---

**Concept** Plants can produce their own food.

---

Teacher prepares two identical plants.

Teacher shows children two plants and asks;

'What will happen if one of these plants is covered for next 10 days (of course it will get water)?'

Teacher asks again;

'If the plant is covered what will miss?'

Children may answer

'Sunshine'.

Teacher asks again

'What will happen if the other is not covered (of course getting water)?'

Teacher asks again;

'What is the difference we make for these two plants?'

Children may answer

'One gets sunshine and the other not'.

Teacher asks children to observe what will happen in two weeks time.

(Children should discuss day-duty for recording and watering).

**Activity 4 What plants need 2**

**Teaching/learning material**

Two identical plants

**Concept** Plants produce their own food

Teacher asks about assignment:

How are the plants?

How did you find during 10days observation?

Teacher asks the condition of two plans.

How is difference of plants?

Why it happened

Teacher asks children to conduct group discussion about their finding based on their observation. They need to discuss also why it happened.

Children start to discuss within their group.

Teacher asks children to write down the result of their discussion and choose presenter.

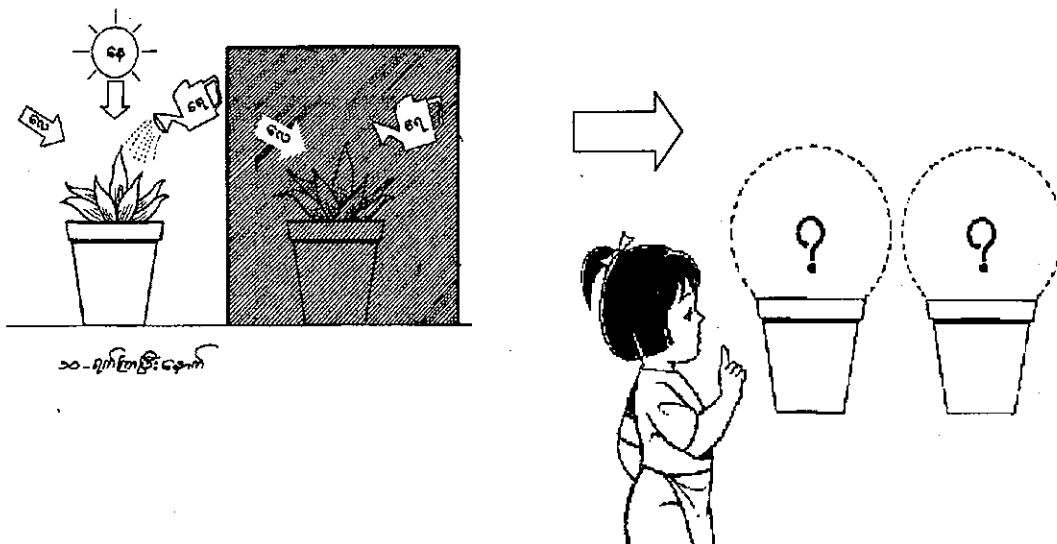
Which plant looks nicer/healthier?

Why it happened

The presenters from each group present their results.

Teacher writes down on the whiteboard.

Teacher can stimulate the discussion, now in whole class why it happened with plants.



**Activity 5 Story Telling; Van Helmont's Tree**

**Teaching/learning material**

**Concept** Plants produce their own food

Teacher tells story about van Helmont

‘Van Helmont was a scientist in the seventeenth century. He lived in Brussels in Belgium. He investigated tree to find what made trees grow.

He planted a tree in a big pot and left outside. He weighted the tree and soil, which he dried up completely (no moisture at all) at the beginning. The tree was weighted 2kg and soil weighed 90 kg. He gave water only everyday.

After 5 years, he weighted the tree and soil. The tree then weighed 76kg (74kg more!) and soil weighed almost same. So he thought that the tree grew because of water and plants consisted of water.’

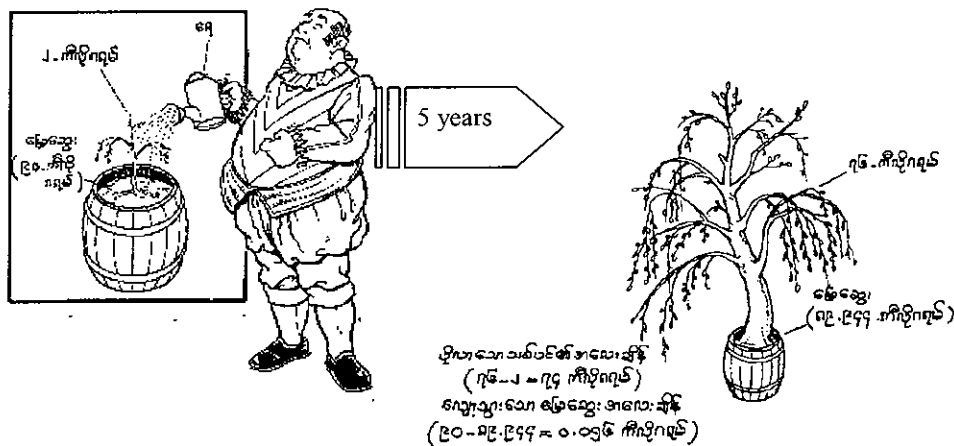
Teacher asks children;

‘Do you agree with Mr.van Helmont?’

Teacher let children discuss.

After discussion, teacher can continue the story.

‘About 200 year after van Helmont's experiment, it is found that it is chlorophyll in green part of plants making starch reacting sunlight and carbon dioxide. This reaction is called photosynthesis. So that plants make their own food by this reaction.’



**Lesson Plan 1-1**

Lesson topic: Plant produces own foods  
 Learning objectives: Be able to describe that animals feed on other organisms and plants, as they are not able to manufacture their own food.  
 Be able to describe that plants have the ability to produce their own food  
 Teaching/learning materials: Plants of same species grown in flowerpots, opaque cover to cover up the plant, bucket and water  
 Teaching period: 70 minutes

**Teaching/Learning procedure**

Learning activities	T	Teaching/ Learning Materials	Points to be noticed
<p><b>Introduction</b></p> <p>Teacher asks students</p> <p>1. Write down your daily activities: (what they do from waking up to going to sleep)</p> <p>2. Can you stop your breathing for while?</p> <p>3. Are you aware of a regular function while you are sleeping? ( In this case, children can tell breath is one of regular function while sleeping)</p> <p>4. How about other animals (for example, dogs, cats, etc.) What do they do when they are awake?</p> <p>5. How about the plants? Do they need to eat?</p> <p>6. Why do you think plants do not need to move, while animals move around?</p>	20	<p>Paper, pencil</p> <p>One's body</p>	<p>Students write down all activities like</p> <ul style="list-style-type: none"> <li>- eating breakfast</li> <li>- going to toilet</li> <li>- going to school.</li> </ul> <p>(students can miss "breathing" easily at this point, but there is no problem)</p> <p>Students stop breathing for a while, but they can not hold it for a long time.</p> <p>After question 1, 2 and 3, students will find out what are essential to live.</p> <ul style="list-style-type: none"> <li>- eating (energy consumption)</li> <li>- going to toilets (excretion)</li> <li>- breathing (respiration)</li> </ul> <p>It is not necessary yet to mention these academic words.</p> <p>Teacher encourages students to think about other animals. Are they similar to human being?</p> <p>Teacher also encourages students to think about plants. Are they eating? Children may answer plants do not need to find food. (They can produce by themselves)</p>
<p><b>Core/Development</b></p> <p>Teacher prepares two identical plants.</p> <p>Teacher put two plants on the table in front of the class and ask students</p> <p>1) What will happen if one of these plants is covered for the next 10 days (water is given for the period)</p> <p>2) If the plant is covered, what does it miss?</p> <p>3) What will happen if the other is not covered ? (water is given)</p>	5  30	<p>Two identical plants</p>	<p>Teacher encourages student to raise the name of plants.</p> <p>Students may answer (sunlight)</p>

Topic1: Different types of living things

Learning activities	T	Teaching/Learning Materials	Points to be noticed																		
<p>4) What is the difference we make for these plants?</p> <p>Teacher encourages students to observe what will happen in 2 weeks time. Teacher distributes 2 plants to each group.</p> <p style="text-align: center;"><b>Conclusion</b></p> <p>Students may conclude “Animal feed on other organism and parts, as they are not able to produce their own food.” “Plants can make their own foods.”</p>	<p>10</p> <p>5</p>	<p>Paper, pencil</p>	<p>Students may answer “one gets sunlight and the other not”.</p> <p>Students discuss day-duties to keep records and give water.</p> <p>Put the plants at the suitable places and students carry out as the following instruction of the teacher.</p> <table border="1" data-bbox="831 920 1390 1249" style="margin: 10px auto;"> <thead> <tr> <th data-bbox="831 920 938 976">Date</th> <th colspan="2" data-bbox="938 920 1390 976">Observation record</th> </tr> <tr> <td></td> <th data-bbox="938 976 1161 1032">Plant (1)</th> <th data-bbox="1161 976 1390 1032">Plant (2)</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Date	Observation record			Plant (1)	Plant (2)												
Date	Observation record																				
	Plant (1)	Plant (2)																			



**Lesson Plan 1-2**

Lesson topic: Plant produces own foods 2  
 Learning objectives: Be able to describe that plants have the ability to produce their own food  
 Teaching/learning materials: Plants of same species grown in flowerpots, opaque cover to cover up the plant, bucket and water  
 Teaching period: 70 minutes  
 Teaching/Learning procedure

Learning activities	T	Teaching/ Learning Materials	Points to be noticed
<p><b>Introduction</b></p> <p>Teacher remains the lesson 10days before and asks students either they have made observation sheets.</p>	5	Two plants same species after 10days  Observation sheets	
<p><b>Core/Development</b></p> <p>Have the students put the experimented two plants of same species on the table of each group and give them assignment to write observation sheet.</p> <p>1) Plants' conditions                  2) Finding in the observation of about ten days.</p>	20		
<p>Students discuss each other and write observation sheet.                  Teacher asks questions regarding the conditions of two plants again.</p> <p>1) What are the differences between two plants?                  2) What are they different like that?</p>	10		It is necessary for the students to explain and present the differences of two plants.  Students' answers will be recorded
<p>Students discuss their findings based on their observation within group and present.                  Make the students group in pairs and discuss the following questions.</p> <p>1) Which plant is greater in growth?                  2) Why is that plant greater in growth?</p>	10		
<p>Teacher explains all students the underlying causes of the differences in growth between two plants.</p>	15		
<p>Teacher mentions all students the underlying causes of the difference.</p>			
<p>Teacher tells students the story in Activity 5.</p>			
<p><b>Conclusion</b></p> <p>Teacher explains</p>	10		

*Topic1: Different types of living things*

<p>Plants can produce their food from AIR and WATER under SUNLIGHT</p>			
----------------------------------------------------------------------------	--	--	--

**Lesson Plan 1-3**

Lesson topic: Foods animals eat

Learning objectives: Since the type of food eaten by animals is not the same children will be able to differentiate herbivores, carnivores and omnivores. Be able to describe that some animals are herbivores, some are carnivores and some are omnivores.

Teaching/learning materials: Picture Chart

Teaching period: 35 minutes (1 period)

Teaching/Learning procedure

Learning activities	Time	Teaching/learning materials	Points to be noticed																				
<p style="text-align: center;"><b>Introduction</b></p> <p>Teacher can start the lesson by asking the following questions. Tell me what food you have ever eaten. What do you like best? Some children like meat, some like vegetable and some like fruits. Then, ask children "Do you think other animals eat meat and vegetable like us?"</p>	5	Blackboard Picture chart.	Children will say, rice, banana, chicken, pork, fish, ice cream, cake, orange, water convolvulus, cabbage, tomato. Let's write them on the blackboard.																				
<p style="text-align: center;"><b>Development</b></p> <p>First please tell me the animals that you have ever seen. Children may answer as follows. Dog, cat, fowl, sparrow, cattle, buffalo, pig, horse, snake, crow, little egret, parrot and frog. (List up what children say.)</p>	5																						
<p>Then, let's think about foods they eat as much as you know. Children in groups discuss and find the foods for each animal. After the discussion, the result of discussion will be presented by children. Teacher will complete the table (shown to the right)</p>	10		<table border="1"> <thead> <tr> <th>Animal's name</th> <th>Food eaten</th> </tr> </thead> <tbody> <tr><td>1. Dog</td><td></td></tr> <tr><td>2. Cat</td><td></td></tr> <tr><td>3. Rat</td><td></td></tr> <tr><td>4. Sparrow</td><td></td></tr> <tr><td>5. Cattle</td><td></td></tr> <tr><td>6. Buffalo</td><td></td></tr> <tr><td>7. Pig</td><td></td></tr> <tr><td>8. Horse</td><td></td></tr> <tr><td>9. Snake</td><td></td></tr> </tbody> </table>	Animal's name	Food eaten	1. Dog		2. Cat		3. Rat		4. Sparrow		5. Cattle		6. Buffalo		7. Pig		8. Horse		9. Snake	
Animal's name	Food eaten																						
1. Dog																							
2. Cat																							
3. Rat																							
4. Sparrow																							
5. Cattle																							
6. Buffalo																							
7. Pig																							
8. Horse																							
9. Snake																							
<p>Then, Teacher suggests, "Let's find the animals that eat only plants in the table." "Let's find the animals that eat only meat." "Let's find the animals that eat plants and meat like us."</p>	5																						
<p>After finding those animals, teacher may explain that <b>Animals who eat only plants are called Herbivore.</b> <b>Animals who eat only meat are called Carnivore.</b> <b>Animals who eat plants and meat are called Omnivore.</b></p>	5																						
<p>Mention other animals for children to categorize into 3 types to make sure their understanding.</p>	5		It is more important for children to understand what 3 types are than to memorize many examples of 3 types.																				
<p style="text-align: center;"><b>Conclusion.</b></p> <p>After this lesson, children will be able to understand what herbivores, carnivores and omnivores are and to name several examples for each type.</p>			Once they understand the																				

*Topic1: Different types of living things*

			ideas, they can categorize any animal even when they see it for the first time.
--	--	--	---------------------------------------------------------------------------------

**Lesson Plan 1-4**

Lesson topic: Characteristics of living things  
 Learning objectives: Be able to describe the characteristics of living things such as eating food, growth, reproduction, locomotion, response and forming cells.  
 Teaching/learning materials: Textbook, ruler  
 Teaching period: 35 minutes  
 Teaching/Learning procedure

Learning activities	T	Teaching/ Learning Materials	Points to be noticed																		
<p><b>Introduction</b></p> <p>Introduce the lesson by asking the children to tell;</p> <ul style="list-style-type: none"> <li>- the names of living things in one's environment</li> <li>- the names of non-living things</li> <li>- what is the most prominent in the group of living things</li> </ul> <p>Let a student stand in order to represent the living thing (human) in front of the class and place a non-living thing (table) beside him. Have the children guess the followings and present.</p> <p>What are the activities that humans are able to carry out for survival?</p> <p>Are non-living things able to carry out like that?</p>	10		<p>Answers will be recorded.</p> <p>“Human”</p> <p>Teacher marks the characteristics that she/he needs out of the children's answers.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Living things</th> <th>Non-living things</th> </tr> </thead> <tbody> <tr> <td>Eating</td> <td></td> <td></td> </tr> <tr> <td>Growing</td> <td></td> <td></td> </tr> <tr> <td>Reproduction</td> <td></td> <td></td> </tr> <tr> <td>Movement</td> <td></td> <td></td> </tr> <tr> <td>Response</td> <td></td> <td></td> </tr> </tbody> </table>		Living things	Non-living things	Eating			Growing			Reproduction			Movement			Response		
	Living things	Non-living things																			
Eating																					
Growing																					
Reproduction																					
Movement																					
Response																					
<p><b>Development</b></p> <p>Have each children group discuss each characteristic within the group and present. Teacher adds the followings;</p> <p><u>Having cellular structure</u></p> <p>All living things are composed of cells. The term, cell, means tiny room. It is found that even a small piece of an organ of living thing is composed of plenty of cells in the microscopic picture. Cells are various in type and size. The diameter of some of the smallest cell is 0.0000001 mm to 0.00000001 mm.</p>	15	Textbook	<p>Have the children observe the picture of cell in the textbook.</p>																		
<p><b>Conclusion</b></p> <p>Each children group will conclude the lesson.</p>	5	Ruler	<p>Let three students see the sample measurement of millimeter.</p> <p>Teacher has to conclude the lesson by telling as follows;                      The characteristics of living things are eating, growing, reproduction, moving, being able to respond.</p>																		

**Assessment (Plant produce their own foods)**

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in the living things present in the natural environment?	Is s/he understands and able to present and discuss the organization of food of plants?	Is s/he able to participate and discuss according to instructions?	Is s/he able to understand properly the where the plants organize foods and the requirements in organizing food?
Is s/he motivated to learn the facts in relation with the organization of food of plants?	Is s/he able to carry out the experiment carefully and able to present and discuss by understanding the requirements discriminately?	Is s/he able to find the accurate observation?	
Does s/he carry out all the activities really?			

**Oral assessment/Group discussion**

This lesson contains the observation of practical activity by taking time. From observation, it also consists of discussion and presentation. Skills can be assessed from the presented facts of observation.

- test the attitude of children
- test the activity of children

**Written assessment**

Let the children write daily observation record for the two plants undergoing experiment for 14 days.

Write your activity of a day.

1. Did you notice one normal activity when you slept deeply?
2. Can you stop the inspiratory and expiratory activity from your nose for a while?
3. Describe the name of other living thing that can perform the characteristics of life such as eating food, respiration and growth.
4. Do the plants need to eat food? In experimenting that plants can organize food themselves:
  - The two plants will be watered daily for about (14) days. One plant is covered to prevent light. What will happen to that plant?
  - Getting which fact is prevented by covering the plant?
  - The remaining plant is not covered and watered regularly.

What will happen to that plant?

In the activity of question (1) and (3), do you know the different facts for the two plants.

**Message to Teachers**

1. Portraying and discuss by taking interest about the living things in the environment
2. Understanding correctly and presenting the basic facts studied by doing practical activity with the five senses.
3. Observation by relative thinking. (Comparison with the prior known experience).
4. Discussion by relative thinking(Guessing ability)

**Assessment (Food animals eat)**

Point of Assessment

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
<p>Is he/she able to bring out the names of animals around one's environment?</p> <p>Is he/she able to bring out the name of foods that one is eaten?</p> <p>Is he/she motivated to be able to present the information related to the lesson from his/her knowledge.</p>	<p>Is he/she able to present the outcome of group discussions?</p> <p>Is he/she able to think by matching the name of animals and their food?</p>	<p>Is he/she able to participate in the group discussion activities?</p> <p>Is he/she able to carry on with the facts related to the lesson with peers or teacher?</p>	<p>Is he/she able to understand the difference of eating habits among animals?</p> <p>Is he/she able to differentiate animal groups based on the difference in eating habit?</p>

**Oral assessment/Group discussion**

1. Describe the foods that one eats.
2. Describe the names of animals that you have ever seen in your environment.
3. Describe in groups the foods that each animal eats.

**Written assessment**

1. Describe the herbivorous animals.
2. Describe the carnivorous animals.
3. Describe the omnivorous animals.

**Message to Teachers**

The teachers need to collect necessary information to give help and guidance to students in their discussion activities.

It is necessary to ask effective question types in the student's thinking activities.

**Assessment (Characteristics of living things)**

**Point of Assessment**

Interest/Attitude/ Motivation	Scientific thinking	Technique	Knowledge and understanding
Is s/he interested in discussion activities?	Is s/he able to think, discuss and present from the discussion activities?	Is s/he able to communicate the characteristics of taking responsibility by one's body in relation with the lesson?	Is s/he able to understand really the characteristics of living things?
Is s/he motivated to discuss interestingly in discussion?	Is s/he able to think the right way about the organization of one's body?	Is s/he able to communicate with the teacher and peers in relation with the lesson?	Is s/he able to understand differently each characteristic of living thing
Does s/he enjoy the discussion activities?			

**Oral Assessment**

1. Think and bring out the names of living things and non-living things.
2. Discuss and present each characteristic of activity that living thing can carry out

**Message to Teachers**

It is necessary for the teacher to give help and guidance by collecting information for the students to be able to think and bring out each general characteristic.

It is to portray the students to be able to understand properly the cellular structure in the characteristic of living thing.