Use of Different Activities to Improve Sixth Graders’ Interest of Learning “Plant Diversity”

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Abstract
This study based grade 6 science was conducted using 30 students in a government secondary school in Sri Lanka to improve interest to learn plant diversity. The particular unit covers three competency levels of investigating plant diversity in relation to morphological feature, investigating plant diversity in relation to habitat and classifying plants using criteria and methods. The results of the study showed that students were enthused with learning through field observations, natural specimens and electronic visual aids rather than use of pictures, written articles and lectures by teachers. As well it revealed that the teacher has a great responsibility in applying the most effective methods and materials in teaching-learning process.

Keywords: plant diversity, unit plan, field observations, electronic visual aids, pictures

INTRODUCTION

The Secondary School Science Curriculum
The present educational system of Sri Lanka is derived from the British system, which was introduced by the British colonial masters in the 19th century. Sri Lanka’s education structure is divided into five levels namely primary, junior secondary, senior secondary, collegiate and tertiary. Grade six is the bridging year between the integrated curriculum of primary school and the subject-based curriculum of secondary school. As well it will serve to inculcate the necessary study skills for secondary education while reinforcing the essential competencies acquired during the primary level. Learning science is a new experience for grade six students since they do not learn science as a separate subject in the primary education.

Under the educational reforms in 2007, competency-based, activity oriented and student centered secondary school science curriculum was introduced to promote creativity, problem solving skills, social skills and developing imagination. From grade six to nine it has been developed as a common curriculum, which build up like a spiral where students expand their knowledge in science year by year. This common curriculum of science is based on broad themes including observing the environment, organisms and life processes, matter, their properties and interactions, earth and space and energy, force and work. The lessons are planned according to 5E model so that students engage in learning through group activities.

Plant Diversity
The unit four of grade six science syllabus discusses plant diversity in detail, and it gives the fundamental knowledge about the plants which is essential to understand the nature of plants and their processes taught in the science curriculum in upper grades. Furthermore, by learning particular units at grade six, students are expected to gain certain skills under the competency of investigating plant diversity. Further, the particular competency is developed under three competency levels at the grade six as, investigating plant diversity in relation to morphological feature, investigating plant diversity in relation to habitat and classifying plants using criteria and methods.

The theme of plant diversity does not continue in seventh grade but appears in the syllabus in grade eight and nine. All knowledge gained in grade six to nine on plants are used in grade ten and eleven in different lessons to explain different aspects and processes of plant life. Hence, unit four in grade six can be considered as a stepping stone to the world of plants.

In this unit students learn the diversity of plants in relation to leaves, stems, fruits, habitats and finally they develop a dichotomous key using the diversity of plants. The natural world around us can be studied effectively if one gets the real experience of it. Observation of living plants in their natural environment is quite essential for better understanding. When learning takes place only through paper and pencil there is a tendency to internalize misconceptions because students are...
different in their knowledge, skills and ability levels and the way one understands or sees the world is different from the other.

RESEARCH QUESTIONS
Through personal experiences and as viewed by some teachers who teach sixth grade science, it was found that students perform fairly well during the lessons but unable to do well in follow up activities after the lesson. As well it was found that majority of the students have no much interest towards the unit. So that, it is teacher’s responsibility to make the lessons fruitful rather than depending on the pre-planned activity schedule given by the authorities. Therefore, the particular research aimed mainly to answer the question “How teacher can make the lessons interesting and effective?” while achieving the following objectives.

- To investigate the attitudes of students and teachers about learning and teaching “Plant diversity”.
- Prepare an activity plan to facilitate the teaching–learning process of Unit 4 Science in Grade 6 in order to improve students’ knowledge and skills in studying plant diversity.
- Assess the effectiveness of implementing different activities in teaching–learning process of plant diversity.

METHODOLOGY
The subjects
The subject of this consisted of 30 students in grade six of a type 1C school in Katugastota Education Zone of Kandy district, Sri Lanka. A sample of 30 students of grade seven (in 2012) students who have been taught the particular unit by five different teachers were randomly selected from different schools. The sample included 18 girls and 12 boys. To get the teachers’ views on the topic, to evaluate the problems and difficulties faced by teachers during teaching and to find out the teaching methods used, a sample of 30 teachers from different schools (22 females/8 males) were used. All the teachers in the sample are presently teaching or they have been taught grade 6 science in previous academic years.

THE RESEARCH ACTIVITIES
The research activities were conducted in three phases.

Phase 1: Preparation of activities
Phase 2: Implementation and data collection
Phase 3: Analysis

Phase 1: Preparation of Activities
At this stage prior to the preparation of lessons the main research sample (30 grade 6 students) were given Pre–test mainly focusing on checking the existing knowledge which has been gained from primary education as well through day-to-day personal experiences. Another questionnaire was distributed among 30 students in grade seven. It was expected to obtain information about students’ preferences towards the unit, the learning methods they followed and the difficulties faced by them during the learning process in their previous academic year.

30 science subject teachers who conducted classes from grade 6 -11 were given a questionnaire to evaluate the problems and difficulties faced by teachers during the teaching process and to find out the methods of teaching used in the unit. In addition to the questionnaire, informal discussions were held with both teachers and the students.

As the next step, preparation of activity plans for teaching learning process was done. The grade 6 school text books, the teacher instructional manual, some other materials were studied comprehensively. Furthermore, the secondary science curriculum (Grade 6 to 11) was studied to understand how the theme “Plant Diversity” develop in each grade and to recognize the inter-connections between each developing unit in every grade. Other than these factors the pre-test results, responses of the teachers and grade seven students were taken into consideration.

Preparation of the concept map based on selected key terms to recognize the inter-connections between key terms, main ideas of the unit and the subtopics, formation of lesson objectives (including using, reflecting and constructing objectives), planning lessons and teaching learning materials were completed at this stage.

Phase 2: Implementation and Data Collection
At the second phase implementation and data collection were accomplished. 10 lessons of 40 minutes were conducted by the researcher. During the implementation phase different types of activities were used to give the content and in all most all the activities students worked as pairs or worked in groups. As well students continuously assessed through written or oral presentations. Throughout the period students were observed and interviewed informally to collect data on their interest of the lesson, teaching method and activities. Furthermore, at the end of the teaching-learning process they were given a written test to get an idea of their level of understanding on the unit.

Phase 3: Analysis of Data
A detailed discussion was carried out based on the results of the pre-test, post-test, students’ and teachers’ responses for questionnaires, field notes and transcripts of informal discussions during the process in order to arrive at conclusions and to make recommendations.
RESULTS

Pre-Test Results of Grade 6

The pre-test was aimed to evaluate the existing knowledge of students on plant diversity. According to the results, 90% (27 students) have scored above 50 out of 100 and it gave the general idea that students have satisfactory knowledge on plants and their nature. Usage day-to-day life (colloquial) common terms for naming plant parts was noticeable character among the students. As a whole, students have a fairly a good knowledge on main parts of the plants and their functions but lack of understanding based on morphological variations in plants and plant’s habitat.

Attitudes of the Grade 7 students

All the students in the sample have followed the unit and also like to study about plants. 34% of thought, that this topic enhances the knowledge on environment and its diverse nature. 23% of students thought that the unit enriches the knowledge and understanding about plants, their nature and habitats. Further, 21% said, the unit explained how plants change their basic morphology to survive in their respective habitat and 10% of students viewed it as a good opportunity to identify and study the plants in their immediate surroundings.

36.7% (11 students) felt it is very easy and interesting to study about plant diversity at grade 6. For 20% of the sample (6 students) the unit was easy to learn but they said it was not interesting. There were 7 students (23.3% of the sample) who viewed that the particular unit was interesting but not easy to learn. For 20% of the sample (6 students) it was not easy and interesting. In general 63.3% of the students (19 students) showed no positive attitude toward the unit. According to students, 14 (46.7%) have studied the unit using the teacher’s note. 43% of students (13 students) have participated in field visits with their teacher. 26.7% of the students have used plant specimens and 6.67% have used extra printed materials to study this section while none used videos or computer assisted learning method to learn unit 4. Further, students have faced following problems during the learning process.

- Inability to find certain plants specimens needed from the immediate surroundings.
- Lack of chances to explore plants growing in different habitats.
- Lack of resources to access internet or watch videos during schools hours.
- Inadequacy of information given in the textbook to understand the lessons.

Teachers’ perception on the unit 4, “Plant Diversity”.

According to the responses of teachers, it was revealed that the particular unit in grade six science syllabus widens the learners’ perception on plant world and the environment while giving them an opportunity to observe and study plants in their natural environment. Students also can study about the morphological and functional diversity of plants. In addition to that it lays the foundation for future studies on plant world while developing the students’ attitudes towards importance of protecting environment.

70% (21/30) of teachers prefer to use the lessons plans given in the Teacher Instructional Manual (TIM) as they can use the given pictures and documents in teaching. The rest of the teachers (30%) said that they deviate from what is given in the TIM according to the situation.

As reasoned out by them the activities given in the TIM were not possible to conduct due to lack of resources. Two teachers (6.7%) said that some activities are complex and another two (6.7%) said that activities given are not appropriate. They used different teaching methods such as field observations, short dramas, role plays, articles, pictures, photographs and computer based activities.

According to the grade six Teacher’s Instructional Manual, the lessons are supposed to be completed within 9 periods of 40 minutes. In the real situation it was difficult to complete the unit within the allocated time. Only 17% of the teachers were able to complete the unit in the allocated 9 periods. All the others (13%) spent more than 9 periods to complete the unit. Ten periods are needed by 3% and 4% required 12 periods for the unit. More than 12 periods are necessary for 6% of the teachers. As stated by 43% of teachers (13 teachers), through pictures and articles given in the TIM, students cannot get the real experience and were unable to visualize the plant properly by reading an article. 20% mentioned that students get an idea about the plants which they find in their immediate surroundings only.

Furthermore, 33% of teachers tell that in the teachers’ guide only a limited number of plants are given as examples and it is disadvantageous when students preparing dichotomous keys. 36.7% stated that since students have not experienced plant habitats like seashore and mangroves, it is difficult to make them understand the features existing in those plants. Arranging field visits to different eco-systems becomes difficult due to the financial problems and matters like school policies. Many urban schools do not have a school garden rich enough to observe plants in their natural environments. During informal discussion with teachers, it revealed that they are reluctant to go for other methods of teaching because it is difficult for them to prepare extra activities and teaching-learning aids due to time constrain. Additionally, financial uncertainty in rural schools
limits the use of computers, multimedia facilities and other electronic equipment.

As a whole when it comes to discussion on students’ participation, interest and performances in the unit, it was revealed that students are familiar with few plants in their surroundings. Though students can memorize facts they failed in real world application when a question or activity given. Students show positive responses in activities when natural specimens are provided to them. However, students have understood the value of plants and their importance and the unit has been able to bring about an attitudinal change in the students.

**Students' Comments On The Teaching-Learning Process**

In teaching-learning process the researcher used field visits, natural and preserved specimens, pictures, PowerPoint presentations, video clips and games. 93% of the students preferred field visits as they can see how plants live in their natural environments. During their visits out of the classroom, it was observed enthusiastic participation for the activities and they engaged in the activities with a real commitment.

Use of natural specimens for studying was preferred by 73% of the students. As viewed by them through live specimens they are able to see and feel the things really and it helps them to remember differences and unique features easily. When it comes to PowerPoint presentations and video clips the whole group preferred those two methods. As viewed by the students they were able to get to know about some rare plant from PowerPoint presentations and video clips. Most students did not like reading articles on plants because some features like respiratory roots, cannot be visualized through reading.

Studying through games was preferred by almost all the members in the group since they did not feel that they are learning. Group activities were favored by the 80% because it provides them with more space to exchange their ideas and helps in better presentations through sharing each other’s skills and abilities. As well it was interesting and enjoyable to work with friends. Then again 20% said that they do not like group activities because they do not get equal chance to contribute to activities and they felt neglected by the others. As a whole field visits and use of computer assisted materials were the most preferred by students.

**Results of the Post Test**

As a whole when the questions are given based on the unfamiliar plants which were not found in the immediate environment, a few students failed to give correct answers. Except three in the group all the other 27 were able to name the parts of the plants with correct scientific terms and main function of each plant part. Moreover, it was unique that the same three students mentioned that giving beauty is the main function of flowers. The very same idea was come out from the student during the initial discussion sessions. Hence, it showed that even after the teaching-learning process some of the students have not changed their prior ideas. In classifying plants to complete the dichotomous key 73.3% attempted accurately and other faced difficulties in deciding on variations in morphological and functional variations in plant parts.

**DISCUSSION**

Learning about plants is very useful and interesting. Human beings and most other animals are almost totally dependent on plants, directly or indirectly, as a source of energy. Thousands of species of higher plants, and hundreds of lower plants, are currently used by humans for a wide diversity of purposes (Krupnick, 2001). However, as revealed by the questionnaire given to previous year grade 6 students, only 36.7% felt studying plant was very easy and interesting.

In the teaching-learning process the active involvement of both student and teacher is essential. Generally teachers act as mediators between the student and the curriculum. For that teachers have to think about factors like facilitating individual differences, the content to be taught, suitable teaching methods and materials and availability of resources.

As stated by Shante (2009), since there are three kinds of learners (auditory learners, visual learners and tactile learners) in a classroom teacher has to use various teaching techniques. Students easily study biodiversity with active participation in the field-based activities and the experiences gained through the active participation of the environment confirm their attitudes of conservation. So that, students were given more opportunities to go outside the classroom to observe plants. As well, it was observed high students participation when live specimens were taken in to the classroom. Especially, those who couldn’t express well in written forms were able to present their observations through drawings.

When students were given picture or a photograph they become concern about the gross features rather than going for more details. As well students interest towards the lesson was not at a satisfactory level. Uneasy, lethargic behavior was shown by the students and they completed the tasks very quickly with incomplete answer sheets. Scheidies (1999) has stated that, from textbooks, the students learn about the environment. The information may interest some students, but bore others. In order to enhance the knowledge on the topics like diversity of plant roots, stem and habitats, computer assisted teaching aids
were also used. Though students have seen aquatic environments and epiphytes, they are not familiar with seashore and mangroves. It was difficult to arrange a visit during the study due to rules and regulations and financial problems faced by the school. Therefore to teach the particular unit video clips taken from “YouTube” and a PowerPoint presentation were used. Students’ participation was high during these sessions and through their behavior and ideas, it was found that students much preferred to study using computer.

Throughout the teaching–learning process students were given opportunities to work with their peers and it was observed that except few, many like to work in groups rather than involve in individual work. As stated by Cooper (1990), students who are involved in ‘group work’ during class have been shown to develop a deeper understanding of the subject matter and increased problem solving skills. All the groups in the sample tried to do their best and a better presentation than the other groups. During the presentations they helped each other and it was noticed that students were discussing about examples, reasons and causes for what they were learning at the time.

Evaluation based on each lesson was very much important to understand how well the students have perceived the lessons taught? and the results of the presentation than the other groups. During the presentation were used. Students’ participation was high during these sessions and through their behavior and ideas, it was found that students much preferred to study using computer.

Effective lesson planning increases the quality of teaching and learning, decreases the amount of stress, and serves as a valuable “map” to guide teachers to their goal. Moreover, Feden (1993) stated that when teachers find a creative way to connect a new concept to students’ prior knowledge, the student’s brain opens up, sees meaning and is ready to place incoming information into long - term memory and it is more likely to retain in an organized fashion which resulted in successful learning. In addition, pre-planning of lessons allows teacher to manage time and resources efficiently and provides a bird’s eye of view of things to be taught and learned by students every day. It provides the teacher to keep the teaching process not monotonous and redundant.

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All the students in a class room are not equal in their ability levels and come from different socio-economic backgrounds. There are students in the classroom that cannot write and read well, who cannot express their ideas through words but good in drawing and crafting. The teacher can assess such students from their performances rather than giving them written tests.

Views of teachers and students indicate that teaching–learning process of the particular unit or any other lesson, which is related to the nature, will be effective, if it is taught with suitable teaching–learning aids. Preparation of outdoor laboratory or nature museum will also be very much beneficial to carry out lessons related with the natural environment. All schools are not equally equipped with modern technology. Though schools in urban areas have computer facilities and other electronic...
equipment schools in rural areas lack such facilities or sometimes though they have facilities, they lack human resources to handle them or school is not economically strong enough to bear the expenses. As a remedy for this, teachers can discuss, can plan lessons, can decide on appropriate teaching learning methods, resources, activities and evaluation methods and materials during their in-service sessions or workshops. As well teachers can make use of their different capabilities to help students if they work together.

It is also possible to arrange workshops, field visits or nature camps for students. According to Scarce (1997) field activities are first hand experiences that help the learning process. Direct experiences are great learning tools. It provides a chance improve both mental and physical skills. For that reason field visits will be an effective tool in lessons associated with nature and it will confirm their attitudes towards conservation. Therefore, it can be concluded that students will gain higher achievement levels with well-planned lessons including variety of activities favoring learner differences.

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