

## **Perspectives of Learning Science Effectively: Comparison between Western Australian Teachers and Malaysian Teachers**

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### **ABSTRACT**

Malaysia hopes to be a developed country which is driven by the industrial and agricultural sectors by the year 2020. This aspiration is guided by Vision 2020 and in order to achieve this, the manpower of the country must be developed and furnished with strong technological, mathematical, and science backgrounds as early as the primary level. It is important to note that effective learning influences the attitude of the students towards science, and if Malaysia is to develop in accordance with Vision 2020, this issue must be addressed. In developed countries like Australia, the learning of science is developed humanistically to attract students to science. The learning of science in Australia involves materials, environments, and activities which encourage students to actively participate in the class. Therefore, it is important to investigate teachers' perspectives towards students' learning as teachers are facilitators of learning. This paper discusses the findings of a qualitative study that was carried out to compare the perspectives of primary science teachers from Malaysia and from Western Australia, with the focus on five research questions. The first question is "what are the teachers' perspectives of learning science?", whereas the second, third and fourth are, "what are the teachers' perspectives of effective teaching methods, the importance of teaching aids and implementing science process skills in the learning of science?" and the fifth question is, "how to assess the progress of the students in learning science?" The participants of the study were twelve primary science teachers from Western Australia and from Malaysia, respectively. The data collection approaches employed included open-ended questions, non-participant observation techniques, and document collection. The findings indicated that there are four types of teachers' perspectives of learning science, three perspectives of the implementation of science process skills in learning science, and five methods in assessing students' progress in learning science.

**Keywords: Learning Science, Western Australian Teachers, Malaysian Teachers**

### **BACKGROUND OF THE STUDY**

Science is a way of explaining how things work and a means for understanding the world around us. Thus, Science education can provide the necessary experiences which will enhance children's perspectives of science. According to Turgut (2008), science educators' search for ways

to help students learn science more effectively is an on-going process. Science education is seen as the idea of more authentic contexts for presenting scientific knowledge (Roth, 1995), encouraging students to take part in discussions, argumentation and social negotiation (Newton, Driver and Osborne, 1999) as well as developing their problem-solving skills (Slack and Stewart,

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1990). Therefore, Science teachers should help children develop their knowledge of Science as well as scientific knowledge (Bentley, Ebert and Ebert, 2000). Yager and McCormack (1989) stated that the learning of Science involves the five domains of Science education, which are:

- a. Information: knowing and understanding
- b. Process: exploring and discovery
- c. Creativity: imagining and creating
- d. Attitudes: feeling and valuing
- e. Connection: using and applying

The learning of science in schools should be in line with the challenges and the development in Science education. The eight components of Science in School (SIS) by the SIS project team in 2003 described the characteristics of teaching and learning which effectively support student learning and engagement in Science. The eight SIS components are listed below:

- a. Students are encouraged to engage actively with ideas and evidence;
- b. Students are challenged to develop meaningful understandings;
- c. Science is linked with students' lives and interests;
- d. Students' individual learning needs and preferences are catered for;
- e. Assessment is embedded within the science learning strategy;
- f. The nature of Science is represented in its different aspects;
- g. The classroom is linked with the broader community;
- h. Learning technologies are exploited for their learning potentialities.

(SIS Project Team, 2003)

It is important to note that the Western Australia Curriculum Framework has nine outcomes for the learning of Science. Teachers are given the choice to adjust the framework accordingly so as to suit their classroom environment. Nonetheless, for the framework to be successfully implemented, the elementary Science teachers must fully understand the philosophy behind the framework and must be

able to transform their perceptions of teaching and learning environments into their planning of students' learning. The teaching strategies adopted should therefore develop their students' inquiry skills, the ability to make decision, have authentic contents, and pay attention to the values and attitudes of the students who will be the scientifically literate future citizens (Turgut, 2008).

In Australia, various approaches are used in learning Science in the classrooms. An example of this is the programme, 'Primary Investigations', which is a large Australian primary school initiative (Australian Academy of Science, 1994) using the '5Es' approach. The 5E model is a simple model which encompasses several principles and is used in the primary science curriculum, as follows (Goodrum, 2004, p. 62):

- a. Engage: students' interests are captured through a stimulating activity or question;
- b. Explore: students explore problems or phenomena through hands-on activities.
- c. Explain: explanations and scientific terms are provided to students to help them develop their ideas.
- d. Elaborate: students apply to new situations and discussions to clarify their understanding.
- e. Evaluate: students evaluate what they have learnt.

It is believed that children learn by constantly constructing new knowledge. What is needed, however, is an effective means of instruction that facilitates the construction of concepts identified in the curriculum. (Hubber and Tytler, 2004) discussed the different phases which are common to all conceptual change approaches. These phases are as follows:

- a. Preparation and planning: involves the gathering of materials and planning of activities;
- b. Exploration and clarification: focus is provided and activities are introduced to probe students' conceptions;
- c. Challenge: students' intuitive views are challenged through engagement with activities which are designed by the teachers;

- d. Investigation and exploration: students carry out investigations to explore their questions and seek for evidence;
  - e. Application and extension: discussion and debates to clarify the scientific view and to apply it to a range of situations;
  - f. Reflection and revisiting: teacher encourages students to reflect on their learning processes and share their findings and ideas.
- (Hubber and Tytler, 2004, p. 39-40)

Thomas (2000) stated that the idea of assigning projects to students is not a new one and there is a longstanding tradition in schools for “doing projects”, incorporating hands-on activities, developing interdisciplinary themes, conducting field trips and implementing laboratory investigations. Grey (2004) described projects as ideal settings for developing inquiry skills which enable us to better understand our assumptions and the consequences of our actions. A challenging driving question, an investigation process, resources for search, student autonomy, student-centred design, teachers’ guidance, collaborative work, and presentation of products are some guiding features of the projects.

Discovery learning is an approach to the teaching of Science that emphasizes students’ personal experiences with information and materials as a foundation for conceptual development. Children are provided with materials to manipulate. The Science process skills are important parts of systematic investigations. The emphasis of such techniques is on having children to be actively involved in the manipulation of materials and the consideration of their own ideas and those of others. Hence, the underlying principle is very much similar with the five domains of Science learning approach suggested by Yager and McCormack (1989). Students must first understand the information that is related to their personal experiences, and only then they are able to manipulate the material by exploring and discovering. Students’ active participations in the manipulation of materials allow them to be creative, which in turn enhance their ability to formulate connections and relationships between

the material and their personal experiences. This learning environment will be more meaningful and effective to the students. It is important to support the learning of Science of all children by providing a variety of opportunities for them to learn. In addition, teachers should provide diverse learning opportunities in the situations which they set up in the classrooms. Students, through their interactions with material, teachers and peers, will construct their own purposes for the lessons, develop their own intentions in relation to the activities, and formulate their own conclusions. Even today, children are often told that the Scientific method consists of a series of steps beginning with observations or questions, proceeding to the formation of hypotheses and then tests, and ending in conclusions (Bentley *et al.*, 2000).

Furthermore, teachers need to remember that science is not a collection of answers to a question, but the search for information that answers the question. Thus, Science provides an opportunity to help children make observations, explore, discover, and build knowledge bases from which they can construct their own explanations. Teachers have the opportunity to help children transform those questions into investigations. Therefore, students need skills to carry out investigations and experiments. The basic Science process skills represent the tools which enable an inquisitive mind to discover answers. This will result in the existence of an active classroom where students are engaged in activities which help to develop valuable skills while learning Science. This concept is very important in the 5E model implemented in the Australian Science classrooms, as students are encouraged to explore problems through hand-on activities where they provide explanations and develop their ideas. In other words, students need to acquire investigative skills so as to prepare them for the process of meaning making in their Science classrooms.

How teachers perceive learning is useful in understanding classroom teaching and assessment practices. It is obvious that assessments serve many purposes other than assigning grades. As classroom teachers,

assessments play a role in two important areas, namely designing effective instructions and measuring students' performance. There are three general approaches to assessments in terms of the tasks required of students. The first is when students demonstrate familiarity with a Science concept through identification of information. For example, a test that makes the use of matching or multiple-choice questions. The second is when students demonstrate awareness of information related to a particular concept by supplying discrete or specific pieces of information, such as in tests which use a fill-in-the-blank format. The third is performance-based assessment where students demonstrate understanding through the application of information and newly acquired skills.

Performance-based assessment requires students to be actively involved in solving problems rather than recalling information or guessing at correct choices. There are numerous techniques which can be employed, such as checklists, write-ups science journal, inquiry reports, portfolios, and scoring rubrics. The purpose of using a checklist is to make sure that students follow the instructions correctly. Using a checklist is an efficient way for teachers to document students' performance during classroom activities. Teachers can add comments about the quality of skills demonstrated and these comments are also a form of recorded evidence. Meanwhile, written journal entries provide physical evidence of students' progress and cognitive growth. Science writes-up are often used to collect data during investigations. This form of assessment can be used to assess students' abilities in collecting and organizing data. Inquiry (research) reports are written communications which are prepared by children to document investigations which are essentially designed and conducted by them. Each inquiry (research) project begins with a question formulated by the students. In this context, the students identify a topic of personal interest, and this is followed by a variety of possible ways to collect information.

Portfolios are representative collections of work samples over a given period of time, and they allow for a reflection of the learning that has taken place. This assessment allows continuous monitoring of a student's achievement by showing diversity of tasks and personal growth. In fact, portfolios are the most familiar form of authentic assessment. They combine various forms of alternative assessments and contain multiple and diverse examples of student-generated products. It is important to note that assessment is an important tool not only for teachers to assess the progress and their students' understanding of the contents taught, it is also an important tool for students to improve on the quality of their learning experiences. In addition, assessment is being emphasized by most of the Science teaching models highlighted in this article, which include the models suggested by Hubber and Tytler (2004), the SIS project and the 5E approach. The idea that students reflect upon their own learning is emphasized so that they can learn to assess their own learning.

Scoring rubrics provide a means for teachers to know what they expect and for children to understand what is expected of them. The rubric describes anticipated levels or standards of accomplishment. Teachers compare each student's work sample to the rubric and determine a numerical score. Kuhn (1997) discusses the importance of rubrics by explaining it in the following way:

The point is that evaluation that involves more than a 'right answer' approach requires guidelines to govern scoring. If the criteria or focus of the evaluation are not specifically defined and made known to students, the teachers' subjectivity may be questioned.

### RESEARCH QUESTIONS

It is important to investigate the teaching approaches and methods employed by teachers, especially those who are regarded as effective teachers, in ensuring effective learning of

Science among their students. The aim of this study was two-fold. The first was to investigate the primary science teachers' perspectives on learning Science effectively, and the second was to compare the perspectives of the primary science teachers from two countries in terms of their similarities or differences. In order to achieve the aims of the study, a qualitative approach was selected as the focus was on the teachers' perspectives and views. In more specific, this study was carried out with the aim to answer these following questions:

1. What are the perspectives of the Malaysian and Western Australian teachers about learning Science?
2. What are the perspectives of the Malaysian and Western Australian teachers about effective methods in learning Science?
3. What are the perspectives of the Malaysian and Western Australian teachers about the important of teaching aids in learning Science?
4. What are the perspectives of the Malaysian and Western Australian teachers about ways to implement Science process skills in learning science?
5. How do Malaysian and Western Australian teachers assess the progress of their students in learning Science?

## RESEARCH METHODOLOGY

### *Research Location and Participants*

The research was conducted in two countries, namely Malaysia and Australia. The first stage of the research was carried out in Malaysia under a fundamental research grant. Meanwhile, the second stage involved conducting the study in a developed country such as Australia, and for this purpose, Western Australia was the selected location.

The participants of the study were selected through the purposive sampling because there was a necessity to choose the sample so as to allow the collection of the most relevant information about the phenomenon being studied (Merriam, 2009). The participants were 24

primary Science teachers from several schools. Twelve participants from each country made up the 24 participants of this study. The selection of the participants was also based on their willingness to participate in the study.

### *Research Design*

The design of this study is qualitative in nature. Three data collection techniques employed in the current study were open-ended reflection questions, non-participant observation, and document collection. The primary source of data came from the teachers' responses to the set of open-ended reflection questions which were developed by the researcher. The advantage of the open-ended questions was to allow the teachers to express in their own words and as freely as possible their perspectives of learning Science, Science process skills, and projects in Science lessons, as well as in assessing students' progress in Science lessons (Fowler, 2009). The second data source was from non-participant observation by the researchers of project presentations in the classrooms, whereas the third data source was documents such as the samples of Science activity work sheets which the teachers distributed to their students during the term. The teachers' perspectives have been reported to be crucial in promoting their willingness "to engage with all issues involved in teaching-and-learning as well as how to interact and communicate inter-culturally" (Scarino and Papademetre, 2002).

Meanwhile, the data from the open-ended reflection questions were reviewed a number of times and analysed qualitatively through a process of open coding (Strauss and Corbin, 1998) in order to identify important concepts and categories. The open-coding process involved labelling and categorizing of the data and the products generated were concepts and categories. The data obtained were divided into the following identified categories, namely the process of teaching and learning science, teaching aids, science process skills, and students' progress. Data obtained from the open-ended reflection questions were analyzed

to examine the similarities and differences in perspectives among respondents from both countries. Turgut (2008) describes categories as concepts which are basic constructs grouped under higher, more abstract levels. From the data analysis process, some assertions were generated as discussed in the section for research findings.

#### *Research Findings*

This section deals with the discussion of three sub-themes, which include the aspects of Science learning, the use of Science process skills in the learning of Science, and the assessment of Science learning. The discussion compares the perspectives of the respondents from Western Australia and Malaysia. This study adopted a qualitative approach as the aim was to investigate the similarities and differences of the respondents' perspectives of Science. Based on this comparison, suitable and effective teaching approaches could therefore be proposed in the teaching of Science. The findings from the data are presented based on the above mentioned sub-themes.

#### *Learning of Science in Primary School*

For the first sub-theme, the respondents were asked to provide their views on the meaning of Science learning. A variety of views were obtained on the definition of Science learning. The first perspective from a respondent in Western Australia was that Science learning involved discovery or hands-on activities. The students were required to explore and investigate so as to enhance their learning and knowledge. The respondents stated that learning Science is:

“for them to discover through learning”

“learning how things work”

“learning that involves exploring, investigating, experiments and hands-on activities”

Meanwhile, a respondent from Malaysia had the following perspective of Science learning:

“pupils get involved in the concept of Science through hands on and minds on learning”

Another perspective of Science learning is that learning involves interactions and group activities. Through group activities, students are able to share information and views in the process of completing the assignments/projects. Hence, one respondent from Western Australia states that Science learning involves:

“interacting with others to discover something”

“background info, experiments and group work”

“working collaboratively”

#### *Method of Teaching and Learning in Science*

Effective Science teachers employ a variety of teaching methods, and choose the best for each lesson. From the data analysis, a Western Australia respondent suggested a variety of teaching strategies which are suitable for the teaching of Science. Some examples of these strategies are:

- a. hands-on
- b. investigations/ exploration/ discovery/ inquiry
- c. group work
- d. experiments
- e. demonstration
- f. explanation
- g. discussion
- h. computer interactive activities

During the classroom observations, the researcher noted that the teacher carried out various activities which required active students' participation in pairs, small groups, or as individuals. An example of a class activity is

students are instructed to do individual research work and later present their work in their class. Appendix A provides a sample of the assignments/projects which are required to be done by students for the year. In total, there are 8 research assignments which the students have to complete individually.

Apart from that, there are also activities carried out in pairs. An example is this activity where students are required to investigate the factors causing a teabag to float in the air when heated. Students are supplied with materials such as tea bags, candles and matches. The following picture illustrates how this activity was carried out in the classroom.

Students were also required to involve themselves in group activities. One such group activity required the students to investigate factors influencing a parachute's flight. This group activity was carried out at a nearby park. The students were required to test their parachutes by releasing them from a tower at different heights. An egg which was placed in a basket was also attached to the parachute and on releasing the parachute, the egg had to land on the ground unbroken. Appendix B illustrates the instructions for the parachute assignment and Appendix C provides a sample of an activity worksheet used in the classroom.

A Malaysian respondent indicated various suitable techniques for Science teaching, which are:

- a. exploration
- b. learning through music
- c. experimentation
- d. discovery inquiry

Most of the respondents stated that the best technique for the teaching of Science is through the use of experiments. There were also those who felt that experiments could be carried out together with exploration and simulation. Another respondent was of the opinion that the use of music could make the teaching of Science more attractive. In more specific, the respondent stated that:

“learning through music. Use song and create the lyrics based on the topic we want to teach”

It can be seen here that the Malaysian respondents were less aware of the approach for the teaching of Science compared to the respondents from Western Australia.

#### *Teaching Aids*

The observations also highlighted the use of multiple forms of teaching aids in the teaching of Science in classrooms. One of the respondents from Western Australia explained that teaching aids are important aspects in the planning of Science teaching. According to the respondent, teaching aids are important because:

“they provide hands-on and shared experience to students”

“students need to have access use hands-on learning and examples”

“vital in conducting experiments”

“they manage to hold students' attention towards the lesson and to some extent, the knowledge retention is longer and better”

“keep children interested”

“very important for students to be motivated”

The respondent from Malaysia is of the opinion that the use of teaching aids helps to create a more attractive teaching and learning environment for Science. As a result, students will show more interest to learn Science. According to the respondent:

“the use of LCD and computer helps in the explanation of concepts”

“assists teachers in the explanation in teaching and learning”

“it will make my lesson more interesting. The pupils enjoy and like the lesson and make able to use their 5 senses in the class”

“students will show more interest in Science if suitable teaching aids are used”

The respondents from both countries generally share common perspectives on the required teaching aids.

### SCIENCE PROCESS SKILLS

There are respondents who associate Science learning with the use of Science process skills. The respondents explain that the learning of Science should involve processes such as making predictions, as well as establishing hypothesis and experimenting. A respondent from Western Australia stated that Science learning involves;

“predictions, hypothesis and working in groups”

Another Western Australian respondent mentioned that science learning involved;

“to be able to think creatively, abstractly and logically. Systematically make hypothesis and to gain knowledge”

A Malaysian respondent explained that Science learning is associated with the understanding of life and the environment. For example, responses from the Malaysian respondent about Science learning are given below;

“understand the students’ surroundings”

“learn about life, matter, physical and nature”

“study about their syllabus and all the things surround them”

There was also a respondent from Malaysia who mentioned that Science teaching is not only about providing students with scientific knowledge but also the application of knowledge in their everyday life. According to this particular respondent;

“students get to know and apply knowledge of science in life”

In both countries, students are required to understand the surroundings in order to acquire knowledge. Hence, for the implementation of Science process skills in students learning, there are three clear perspectives from the respondents. The first perspective of the respondents from Western Australia is that the implementation of science process skills is minimal:

“minimal because of time constraints but I wish it was more”

Some respondents stated that the use of Science process skills is essential in the students’ learning of Science. The respondents from Western Australia stated that the implementation of Science process skills is;

“essential because young students need to be taught step-by-step process in order for them to understand what is being explored”

Another response from the Western Australian Science teachers is that the use of Science process skills is vital because;

“they will be used in tertiary level”

Others felt that Science process skills are very important, as stated by one respondent from Western Australia;

“very important but literacy and Math skills still come first”



“highly important to understand from one activity to the next”

“children learn more by developing these skills through scientific experimentation”

Some of their Malaysian counterparts share the same views. Their responses are as follows:

“very important because without the implementation of Science process skills, learning science cannot happen”

“Science process skills is the most important for students to understand skills”

#### STUDENTS' PROGRESS

The respondents were also required to list ways they used to assess their students' progress in learning Science, with reference to their definitions of Science learning and use of Science process skills. Some of the techniques mentioned by a Western Australian teacher are observations or checklist, scientific write-ups, rubrics, quizzes, and tests. Referring to observations, a respondent from Western Australia stated that:

“observation the process, the way children plan and implement and the final product”

“observation throughout lessons”

“observation of students' interest”

For assessment through scientific write-ups, teachers must prepare guide lines on how to assess the scientific tasks given to their students. Students are informed of the aspects which are emphasized in their write-ups through these guidelines.

The Malaysian Science teachers mentioned various methods of assessment they used to assess students' progress. Some of them stated:

“lots of exercises based on their individual ability”

“give many relevant exercises”

“assess through their worksheets and experiments”

Meanwhile, some respondents from Malaysia explained that students could be assessed by what the students could do. They further mentioned that:

“students can give suitable examples and explain the concept clearly”

“students give the correct responses to Science questions”

Rubrics or checklist are prepared by the respondents based on the topics or themes of the assignments. The marking or grading of projects is done based on the prepared rubric, just like the rubric given in Appendix D.

#### SUMMARY

This study investigated the perspectives and experiences of primary Science teachers of Western Australia and Malaysia. There were 24 teachers involved in this study, with 12 teachers from Western Australia and 12 others from Malaysia. The study used open-ended reflection questions to probe what came to mind first for the teachers when they thought of Science teacher, teaching Science, learning Science, Science process skills, and when assessing the learning process. The purpose of this investigation was to identify the perspectives of these teachers about learning practices in Science at the primary level.

Four aspects of Science learning were examined in this study. These four aspects were teaching approaches utilized by the teachers in teaching Science, teaching aids used, Science process skills involved, and evaluation methods to monitor students' progress. As for the teaching and learning of Science, all the respondents from Western Australia and Malaysia adopted the teaching strategies which

emphasized on students' active involvements in their Science learning process. Some examples of the activities were experiments and explorations. However, the respondents from Western Australia conducted more hands-on activities, small groups or paired discussions.

As for the use of teaching aids, the respondents from both the countries stated that teaching aids are important tools in making Science teaching-learning processes more interesting. Hence, the use of teaching aids plays a crucial role in the planning of an effective instructional plan. One of the respondents from Western Australia stated that the use of teaching aids in Science classroom could motivate students to participate actively in activities conducted, such as hands-on activities. Other than that, students are able to share their experiences with others and are more motivated to learn the subject. Meanwhile, a respondent from Malaysia explained that the use of multimedia teaching aids could help in explaining scientific concepts. The respondents from Malaysia also stated that the use of teaching aids in the Science lessons could encourage students to utilize their five senses while learning.

The third aspect which had been examined was the Science process skills. Based on the findings, three similar perspectives were identified from the respondents of both countries. The perspectives included; (1) the implementation of Science process skills among primary students is still minimal, (2) Science process skills are essential in the learning of Science, and (3) the use of Science process skills is necessary for students to further their studies to higher levels. In addition, the respondents from Western Australia also stated that the use of Science process skills could enhance critical and creative thinking among the students. Meanwhile, evaluation is an important aspect in determining students' progress. The respondents from both countries agreed that the preparation of rubrics or checklists based on topics is useful in assessing students' learning progress of science projects.

It has been argued that first-hand accounts of teachers' perceptions and experiences should influence the contents and methods in any teachers development programme (Berniz, 2007). The findings of this study have indicated that there are numerous similarities and differences between the perspectives of the respondents from both countries. The perspectives which are underlined in this study viewed positive reform as being essentially generated through contextual understanding, researching first-hand accounts and individual perspective valuing changes might happen but innovation was not only dependent on individuals but also on collective will. These perspectives are apparently essential to this study's understanding of the teachers' perspectives and views.

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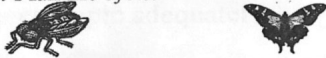

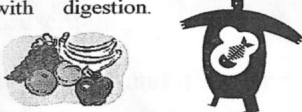

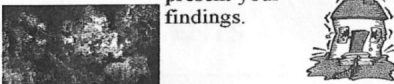



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APPENDIX A



# Year 7 Research topics 2008



<p>1. What is metamorphosis? Choose a living thing that goes through the four stages of metamorphosis. Write a detailed report of each stage. Include pictures and diagrams of its life, habitat, what it eats at each stage of its full life cycle.</p> 	<p>5. What is photosynthesis? Explain how it is important to the planet and mankind.</p> 
<p>2. What happens to the food we eat? What does the body do with it? Research the fascinating digestive system. Include pictures, diagrams and a brief description of all 11 parts that are involved with digestion.</p> 	<p>6. What are fossils? Explain how they are formed and the different types, indicate how they are important to man. Use a map to show where important fossils have been found around the world.</p> 
<p>3. What are Natural Disasters? How do they occur? Choose a significant natural disaster that has occurred over the last 200 years, Research this and present your findings.</p> 	<p>7. Research in detail the effects that smoking has on the body and its organs. Write about your findings. What is the government is doing to lesson the harm cigarettes are causing?</p> 
<p>4. Design a time line that shows the development of flight over the past 400 years. Choose a particular invention or event and report on your findings in detail.</p> 	<p>8. How is electricity generated? Research the many different way that man uses to generate energy. Report your findings using pictures and diagrams and detailed explanations.</p> 

*A sample of a set of topics in Science to be completed by students*

APPENDIX B

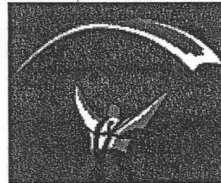
# Parachutes

**Task 1**

**Aim.** To investigate how the area of a parachute canopy effects its landing time.

**Materials and Equipment.**

- Plastic shopping bags
- Cotton thread / string/ fishing line
- Metal washers
- Masking tape
- Scissors
- Stopwatches



**Information**

- Use plastic shopping bags to build a parachute, make your design simple as you will have to build this several times. ( This is your control parachute)
- Use metal washes as your skydiver.
- Use cotton thread/ string or fishing line to attach your sky diver to the parachute.
- Decide what size parachute you will build as your control shape.( don't make it too big )
- Decide how and from what height and where you will drop your parachute each time you test it.
- Time how long it takes your parachute to reach the ground.
- Repeat this test four times, record your results and work out the average.
- Change the size of your parachute only.( make sure it is the same shape as your control chute)
- Repeat this test with four different sized chutes and record your results.

**Write up.**

Predict what you think will happen and why you think this will happen.( do this before you start)

- Draw a table of your results showing all your results.
- Draw and label you diagram of your control parachute.
- Construct a graph to show your results showing size of the chute and landing time.
- Write a paragraph on how you made this a fair test.
- Write a paragraph on the things that could affect this investigation.

**Conclusion**

Explain what happened during your investigation and why you think it happened.  
How could you improve this investigation.



**Task 2**

To design and build a parachute that will safely deliver to the ground a raw egg in a capsule when dropped from the top of the DNA tower in Kings park.

**Requirements**

- You may use any materials and design for this parachute.
- You will need to bring all your materials from home.
- You will have a 2 hour session in class to build and test your design.
- use the information you have gained from task 1 to help.

*A sample of a guided investigation worksheet for Science*

## APPENDIX C

Yr 4 Term 2

ICT Project

Name: \_\_\_\_\_

### What is a Habitat?

A habitat is the natural place where something lives. A shark's habitat is the ocean. A monkey's habitat is the rainforest. Think of a **habitat** and an animal that lives there. What special things does the animal have or do that helps it to live in that habitat?



### Challenge

You are going to study an animal from a habitat of your choice. You will then use PowerPoint to write a story about the animal that includes both fact and fiction. Your final PowerPoint presentation will consist of story slides linked by hyperlinks to fact slides. To complete the activity, you will:

- Research an animal and its habitat (Weeks 1-2)
- Write a story and facts about the animal (Weeks 3 - 4)
- Use PowerPoint to design story slides and fact slides (Weeks 5 - 7)
- Insert action buttons and hyperlinks to connect the story slides to the fact slides (Weeks 5 - 7)

- The animal I have chosen to study is

\_\_\_\_\_.

- I will be working with

\_\_\_\_\_.

*A sample of a Science activity worksheet*

APPENDIX D

Science Write Up Parachute Experiment.

<u>HEADINGS</u>	→	✓	✓ ✓
<u>Prediction</u>	<ul style="list-style-type: none"> <li>• Simple prediction</li> </ul>	<ul style="list-style-type: none"> <li>• Simple prediction and reason</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed prediction explanation and reasons</li> </ul>
<u>Diagrams</u>	<ul style="list-style-type: none"> <li>• Diagrams drawn in pencil</li> <li>• Simple labels</li> <li>• Labels have arrows</li> </ul>	<ul style="list-style-type: none"> <li>• Diagrams have titles</li> <li>• Diagrams drawn neatly in pencil</li> <li>• Colour is added to diagrams</li> <li>• Labels are in black fine liner</li> <li>• Labels are written horizontally</li> <li>• Labels use uppercase letters</li> <li>• Diagram has arrows linking to labels</li> </ul>	<ul style="list-style-type: none"> <li>• Diagrams have titles</li> <li>• Diagrams drawn neatly in pencil</li> <li>• Colour is added to diagrams</li> <li>• Labels are in black fine liner</li> <li>• Labels are written horizontally</li> <li>• Labels use uppercase letters</li> <li>• Diagram has arrows linking to labels</li> <li>• Diagrams have borders</li> <li>• Labels are very detailed with explanations.</li> </ul>
<u>Paragraphs</u>	<ul style="list-style-type: none"> <li>• Simple comments in paragraph form</li> <li>• some observations noted</li> </ul>	<ul style="list-style-type: none"> <li>• Critical comments about all areas</li> <li>• basic explanations and observations</li> </ul>	<ul style="list-style-type: none"> <li>• critical comments about all areas</li> <li>• detailed explanations that show understanding</li> <li>• Fair testing information</li> <li>• Uses scientific language</li> </ul>
<u>Results</u>	<ul style="list-style-type: none"> <li>• Basic table with headings</li> <li>• Graph showing results</li> <li>• Give size of parachute</li> </ul>	<ul style="list-style-type: none"> <li>• Table and graph with headings</li> <li>• Lines ruled</li> <li>• Title</li> <li>• Measurements shown</li> <li>• 4 trails included</li> </ul>	<ul style="list-style-type: none"> <li>• Table and graph with headings</li> <li>• Correct type of graph</li> <li>• Lines ruled</li> <li>• Title</li> <li>• Colour</li> <li>• All trials included</li> </ul>
<u>Conclusion</u>	<ul style="list-style-type: none"> <li>• Simple conclusion and improvements stated</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion and improvements stated and explained</li> </ul>	<ul style="list-style-type: none"> <li>• Conclusion and improvements explained in detail</li> <li>• Conclusion shows a clear understanding of results</li> <li>• Scientific language used in the explanation</li> </ul>

GENERAL INFORMATION

- All headings and subheadings are underlined.
- A line is missed between each major heading.
- Presented neatly on lined A4 paper or typed.
- Diagrams on blank A4 paper.
- Stapled top left corner
- Name and date

*A sample of a rubric for marking*

