

## Statement of participation

### Chalani uresha sandanayaka Ganga Brahakmana

has completed the free course including any mandatory tests for:

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#### Primary science: supporting children's learning

This free 8-hour course explored how to support primary-aged children in learning science.

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**Issue date:** 23 January 2023



[www.open.edu/openlearn](https://www.open.edu/openlearn)

This statement does not imply the award of credit points nor the conferment of a University Qualification. This statement confirms that this free course and all mandatory tests were passed by the learner.

Please go to the course on OpenLearn for full details:

<https://www.open.edu/openlearn/education-development/education/primary-science-supporting-childrens-learning/content-section-0>

COURSE CODE: **E209\_1**

## Primary science: supporting children's learning

<https://www.open.edu/openlearn/education-development/education/primary-science-supporting-childrens-learning/content-section-0>

### Course summary

Science is a key subject area in primary education curriculum frameworks. This free course, Primary science: supporting children's learning, provides an opportunity to consider your own experiences, perceptions and attitudes to science. You will explore and develop some of your scientific knowledge and understanding while considering how you can support primary-aged children's science learning.

### Learning outcomes

By completing this course, the learner should be able to:

- evaluate and advance science subject knowledge
- reflect upon some key scientific concepts and skills relevant to children's learning in the primary years
- consider what can make science difficult or easy to learn, and explore some common misconceptions about science and how they can be addressed
- reflect upon the importance of promoting positive attitudes to science and making children's science learning meaningful, relevant and engaging
- use and evaluate some different approaches to teaching science, such as those involving concept maps and modelling.

### Completed study

The learner has completed the following:

#### Section 1

Science subject knowledge

#### Section 2

Subject knowledge and teaching and learning

#### Section 3

Discovering children's ideas

#### Section 4

Using models in science

#### Section 5

Conclusion



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## COVER PAGE AND DECLARATION

	Bachelor of Education (B.Ed.)
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**I confirm that this assignment is my own work, is not copied from any other person's work (published/unpublished), and has not been previously submitted for assessment elsewhere.**

**E-SIGNATURE:**

**DATE:**

02/02/2022

**EIU Paris City Campus**

Address: 59 Rue Lamarck, 75018 Paris, France | Tel: +33188320435 | Mobile/WhatsApp: +33607591197 | Email: [paris@eiu.ac](mailto:paris@eiu.ac)

**EIU Corporate Strategy & Operations Headquarter**

Address: 12th Fl. Amarin Tower, 496-502 Ploenchit Rd., Bangkok 10330, Thailand | Tel: +66(2)256923 & +66(2)2569908 | Mobile/WhatsApp: +33607591197 | Email: [info@eiu.ac](mailto:info@eiu.ac)

*Science, At school for Primary Learners*

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### **The Introduction**

**Primary Science :Supporting Children' s Learning** is the second course toward my degree **Bachelor of Education ,(B.Ed)**. It is another course designed and edited by by the Open University : Open Learn :*European International University*.

**Primary Science : Supporting Children's Learning** is a course that has tried to discuss scientific knowledge and information for children at a primary stage : how possible is it ? The course focuses on the relationship within the network : teacher / learner / content / institute.

My purpose in this assessment entitled Scientific Knowledge for Primary Children, is to raise this issue of this network, talking about the Main Concepts in this course, their UTILISATION in workplace and the main Challenges facing the education practitioners

## **SCIENCE EDUCATION**

### 1) *Scientific Knowledge involved in Science Education*

#### *1-1 Definition of science*

Science is the opposite of Ignorance. It is the synonym of understanding and knowledge. It is the fact to fathom something and it's reality and origin.

It is the set and accumulation of knowledge that enables people to fathom all those physical things around us and their origins.

“ It is a systematic endeavour that builds and organises knowledge in the form of testable explanations and predictions about the universe. ” WIKIPEDIA.

According to the definition in Wikipedia, historians stress that sciences have existed since the advent of humanity. Archeologists have discovered written records about science or related to science in Ancient Egypt and Mesopotamia in around 3000 BC.

Mathematics, Medicine and Astronomy were common and contributed in shaping Greek Natural Philosophy. Many attempted to explain and to provide proofs for events in the physical world based on natural causes.

Science is the result and outcome of a certain observation and some questioning with the shift to experimentations , modifications and evidence.

#### *1-2 Branches of science:*

Sciences take different forms, various branches, in several fields and disciplines. There are 3 major groups :

1) **Formal Sciences** : They deal with abstract concepts. They use a *priori* (as opposed to empirical.) which are independent from current experiences. The main examples in this field are : Logic and Mathematics.

UpA) **Logic** : It is the study of correct reasoning. Logic has been divided into 2 types :

a/ the formal Logic : it refers to those inferences or truths that are proved to be valid through deductions and conclusions that follow from premises.

b/ the informal logic or what is called critical thinking.

B,,/ **Mathematics** : it is the branch of knowledge in which numbers, formulas, shapes are involved. The major disciplines in Mathematics are :Algebra and Geometry.

## 2)**Natural Sciences** :

They deal with natural phenomena investigations based on empirical evidence. They are concerned with the description and understanding of such phenomena. They include factors of the universe such as Geography.

Physics

Chemistry

Geology

3)**Social sciences** : they focus on everything that are related to Man and Society.

a/ Sociology

b/Anthropology which refers to the scientific study of human behaviour in relation to culture, linguistics and everything that surrounds Man.

c/ Archeology refers to the scientific study of humans in relation to / with the material activity and the material culture.

d/ Psychology : it is the scientific study of the psyche or the inside part of the human being.

## 2) **THE SCIENTISTS**

The scientists are people who have exceptional competence or knowledge in the scientific field.. They are people who have learned and acquired a great deal of information in scientific disciplines. They collect and use evidence and research then organise and set a theory. They observe, test and experiment. Their purpose is sharing knowledge.

### 2-1 **The main qualities of a scientist :**

They should be :

Flexible

Committed to learning, knowledge and research

Curious.

Not discouraged by failure.

Creative and inventive

Motivated

## **2-2 Example of scientists who have impact on humanity :**

**Aristotle** ,(484-323 BC) classified animals and plants.and estimated the size of the world

**Archimedes** (287-212 BC) in Mathematics

**Galilee** (1564-1642) discoveries in physics and astronomy

**Thomas Edison** (1847-1931) the electricity

Marie Curie (1867-1934) invented the first mobile X ray.

**Louis pasteur** (1822-1895) in microbiology and fermentation

**Isaac Newton** (1623-1727) Law of gravity

**Albert Einstein** (1879-1955) developed the general theory of relativity.

## **2-3 Some Nobel winners :**

\*Albert Einstein was awarded The Nobel prize for his achievement in physics.

\*Marie Curie won the Nobel prize in physics and chemistry.

\*Alexander Fleming was awarded Nobel prize in physiology and medicine

\*Emmanuelle Charpentier and Jennifer A. Doudan were awarded the Nobel prize in Physics.

## **3) Some language related to science, :**

**3-1 Active Vocabulary:** Energy...browser...metal...electricity...invent...devise...discover  
...create...finding....release...fabricate... design ..plan...project...observe...test...experimentations..

Biology : animal...gene...vertebrae... cohésion...antibiotic...catalyst.. abdomen ..diffusion .. community ..  
species ... fermentation .. regeneration ..virus

Earth science : surface .. geology ... landforms.. formation weather .. atmosphere... water cycle.. minerals  
...Chemistry : acid ... property ..alpha ...amine... particle

## **3-2 Some symbols related to Science :**

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m...km...g...kg...

## **3-3 Some expressions related to prize winning :**

Pay tribute.... Recognition ...distinctions...commitments...achievements...medal...award...reward...  
prize..foundations..significant..



Nobel Prize....WIPO (Women Invent Property Organization)

#### **4) A THEORY IN SCIENCE**

*Isaac Newton, the theory of gravity, forms the small idea to the bigger one.*

*It is said that Isaac Newton, in 1665 watched an apple fall. He asked why the apple fell straight down rather than sideways or upward. He deduced that there is a force and that this force that makes the apple fall and holds us on the ground is the same as the force that keeps the moon and planets in their orbits. And the Theory of Gravity was born . From a small idea to a big one.*

#### **5)Attitudes toward science education ;**

More and more researchers have been focussing on Science Education. Science Education has become an issue that has attracted increasing attention. This issue hasn't yet reached a consistent conclusion .

Osborn et al(2003) considers that :

“ attitudes towards science can be defined as feelings , beliefs and values held about the enterprise of school science and the impact of science on society.”

Reid (2006) sees it is (three-component) attitude :cognitive, affective and behavioural)

Potvin and Hasni (2014) see the attitudes containing a wide range of sub constructs such as enjoyment, motivation, self efficacy and career aspiration .

Thus, the attitude toward science depends on diverse reasons coming from different places.

Reiss says :“The image ( of science given by the UK on the new set of postage stamps) seems to be that real science is hard physics with military applications, done by males who are white and worked on their own between 1820 and 1940. No wonder so many students drop science at school as soon as They have the chance. « Scientists like Peter Atkins believes and preaches science as « the way to truth.”

While religiosity rejects science and Science education because it is in conflict with religious assertions.

Those attitudes mentioned above may negatively affect the decisions of parents , educationists .HOWEVER, a study *The Relationship between Attitudes toward Science and Academic Achievement in Science :A Three-Level Meta Analysis (2021) reveals a positive and moderate relationship between attitude toward science and language achievement in science.*

It is encouraging then to say that we have to implement science education in our curriculum for children and primary learners.

#### **6) The primary learner to acquire scientific knowledge**

##### **6-1 What are the main characteristics of the primary children ?**

The age between 6 to 12 of a human being is called the primary stage. It is characterised by the. Body and physical changes as well as behaviour changes.

Researchers have stressed that children at this stage of age develop rapidly. . Such changes obviously differ from a child to another. But they happen naturally except for children with special needs.

During this stage of age children acquire more physical power and muscular skills. They get taller and taller and they weigh more and more. Here, they become able to wear their clothes by themselves and be able to practise different types of sports. This sight becomes sharper.

Girls at this age undergo specific changes.

Children's memories at this age become keener . They can remember past events and memorise more events.

Children's behaviour develops as far as their body develops.

Children at this age become more aware, more sensible and more sensitive. Success affects their emotions and they can cope with failure. Children like to participate in activities and enjoy them. Children get more curious and ask more and more questions.

“...spend time wondering why nature is the way it is.” Carl Sagan.

Children then can differentiate between day and night, dark and light and dates. They acquire the knob of numbers, the ability to read and the skill to explain things.

Children tend to work in groups and teams, to collaborate and socialise.

They can also use tools to dismantle and assemble small things.

### **6-2 The primary learners :**

Primary learners are the children that are between 6 and 12 and who are MAKING THE JOURNEY FROM HOME TO SCHOOL. There, educators, teachers and education practitioners intervene . Professionals at school try to ignite the motivation , persistence and compassion that children have in them . Education practitioners have to devote their energy, time and skills to enhance best practices.

### **7) Teaching Science for children at an early age :**

Some people may think that science education at an early age is irrelevant added to the fact that the childhood curriculum is overcrowded. Besides, it is not fair as children at that age have to focus on learning how to read and how to write and count..

Educator Janelle, who is an expert in the field of science education for children, rejects such ideas . She writes *My Teaching Cupboard : Sciences exists everywhere and we cannot simply not teaching it to children at an early age.*

She added : *Science education at an early age has a positive effect and model the future future scientists.*

She calls for *teaching children, especially girls, science, planning and programming science education technology, engineering, Mathematics and producing official syllabuses and textbooks for such purposes.*

*First Discoverers* site considers that children at an early age are curious and flood grownups with unstoppable questions about the world and everything around them. That's why we have to seize that and profit from such innate curiosity and direct their zeal and guide them to scientific discoveries.

### **7-1 Why teaching science to children at an early age ?**

#### **1) To reinforce love for science :**

“ the heart knows today....the head understands tomorrow. ” James Stephens

Research shows that children at the age 7's opinion and attitude towards things may be either positive or negative and will lurk there in them for a long time. It will be hard to get rid of the negative attitudes later. For that reason educators, parents and people in institutions have to protect children from negativity .

#### **2) Create founded background**

and set for them a suitable, strong platform of scientific principles and thinking. *First Discoverers* stresses that even the smallest and simplest activities Can introduce scientific concepts, motivate the children to learn and trigger scientific thinking.

And then ,

“ we give our children roots and wings ” Henry Ward Beecher

#### **3) Reinforcing the mentality of development ;**

“ *Children flourish, to become empowered and allow them to love the earth before we ask them to save it.* ” David Sobel.

Children who have developing mentalities are better than children who have stagnant mentalities. To make children develop their mentalities we have to allow them to be adventurous and to take risks. Science is not only knowing about something and learning facts and data by heart, it is also observing, testing and setting hypotheses.

#### **4) Flexibility before accepting failure :**

When you allow children to test they may fail..Accept their failure they will accept it as a way to learning. Tell them that *making mistakes is proof that you are trying and learning.*

#### **5) Scientific Research skills and competence :**

Skills at scientific research appear when you notice children learn while they play and have fun.

“ play is highest form to inform ”Albert Einstein

Investigative and practical games are important since they push children to ask questions, plan, scheme, ponder and think to achieve their goals. They analyse, try to understand and explain evidence to arrive where they wish. Once you consolidate and reinforce the skill of questioning in the young learners as you try to encourage them to ask and wonder about phenomena around them you enhance the competence of scientific research.

**6) *Enhancing skills for life :***

***“ The art of education is the art of living ” Susan Howard***

Activities during science teaching/learning provide opportunities for the children to develop and practise various skills and qualities such as communicative skills, co-operative competences as well as analytical and deductive abilities .

**7) *Understanding the relationship between science and life :***

because science includes all that is physical, natural, biological .

When children come across general truths, facts and concepts that scientists have set , discovered, invented or predicted, they (children) will learn more about the universe and the world they live in . Therefore they will use their knowledge to explain phenomena and predict them and be able to apply their information and outcomes when they meet new attitudes.

**8) *To be self-confident as scientists :***

Including science in early age children curriculum enables children to have self esteem and to see themselves as qualified scientific learners. And :

**“ never help a child with a task at which he can succeed.” ,**

Thus you have to renew and innovate.

If children believe that science is something they can do, they will be self confident and they will trust their skills as young scientists. They will breed in them a lifelong love of science .

**7-2 *Comments :***

***Correct consideration to teach Science for children at an early age :***

***First Discoverers*** stresses that when it comes to encouraging science education at an early age, many materials to start with are available .

***The activity is more important than the answers as long as you try to incite children to ask questions and you trigger the curiosity in them.***

***Reinforcing the investigative skills in the children is more important than trying to push them to get the correct answer to get the best mark***

***Plan your activities***

***Choose daily and spontaneous activities***

***Funny and practical***

***Short and diverse***

**7-3 Tools :**

Electronic apps help and inspire children

Scholastic

NASA has created a set of apps to provide children with hints and ideas about scientific

- SUD the science kid
- Merlin bird ID
- Toca Nature
- Toca Lab
- StarMap

Monster physics

Hoh ,(2013) stated « emotions, feelings, and values arouse curiosity «

« Perspectivism in Science Education states that science is not a dogmatic eternal enterprise. It is a dynamical, dialectical process. » Pearce 2012, p541.

8) Who teaches Science to primary Learners?

**8-1 Qualities of teachers**

*Teachers in general must have qualities and characteristics that enable them to teach and convey information and knowledge to their students.*

Teachers must be skilled at communicating with students, parents and people around them.

Teachers must be collaborative. They must be keen on team work, open to new ideas, share information and knowledge. They must be open to criticism and blame as they can be proud to be praised.

Teachers must be adaptable to different environments, different situations, different approaches and methods

Teachers have to be engaged and engaging in new activities.

Teachers must treat learners as individuals, understand them, and be attentive to them while having a positive attitude.

Teachers must be patient with learners and with the whole environment.

### ***8-2 Teachers of Science***

BESIDE the above qualities, Science Education requires new standards based on specific professional development (PD) for teachers of science for the specific purpose : Teaching Science.

An effective teaching of science requires that the teacher should have acquired specific information and knowledge for specific practice for specific education.

A teacher of science isn't a scientist. Teachers need to have scientific knowledge.

They have to encourage learners to observe and think. They have to nurture students' curiosity and questioning.

They have to integrate science with other subjects.

They have to take examples from everyday life.

Teachers of science have to focus on details. Their purpose is content-based lessons.

Teachers of science should willingly take part in outside and extracurricular activities, field trips and clubs.

Hands-on experiments.

Use of multimedia materials to teach concepts.

Implement appropriate curricula.

### ***9) Classroom management and organisation :***

The classroom in a primary school for children at an early age is the main environment where they can be involved orally and cognitively while working on a planned and precise program and thus they can acquire the appropriate information.

How to set up the classroom and choose the equipment before the lesson starts depend on the Idea and skills you want the children to learn and the patterns of teaching the teacher has selected. However, what is essential in a room is the existence of pictures, posters, expressions on the walls. They have to be dealing with everything around us in the universe.

### ***10) SCIENTIFIC KNOWLEDGE IN WORKPLACE:***

#### ***The lesson Plan and preparation***

**Level:** Primary Class

**Lesson Title** *Interviewing* The Father of The Playstation

**Objectives** : *students to be able*

*A-* listen for information

*B* use previous information to understand how science works

*C-* Enjoy a scientific invention

*D-* reinvest newly acquired information | language into writing

**Main Skills:** *Listening into writing*

**Lexical Components:** interact- release- envision -electronic-accessories-usb

**Grammar Components:** to be devoted to doing something | to something

to be used to .....

to be dedicated to .....

**PRONUNCIATION** : |ed| of the past pronounced . t \ id | d

| z | - | ts|

**Communication and Language Functions** . expressing devotion — expressing gratitude

**Teaching Aids:** *audio device* -posters of electronic devices - a play station - smartphones- computers - wired devices| wireless controllers-headsets- usb cables-joystick

**Patterns** : *Whole class and pair work*

**Teacher -Students** .....*Student-stude*

### **11) CHALLENGES facing SCIENCE Education :**

First of all, we should stress that teachers of science are not scientists. They were learners about sciences and their different branches and acquired the necessary information and knowledge to deliver to other learners. What they have to do is to dictate and give back what they have taken. Then we can say that students are copying teachers notes. For that reason parents and educators have no zeal about Science Education and it's implementation as a part of Education.

Teachers have little experience in the field , limited qualifications and suffer from lack of professional training and developmental sessions.

Teachers may mis use tools and materials and can not conduct a lab session. It happens that they come across incidents to which they find no solutions.

Teachers may not extemporise or improvise when they come face unpredictable issues.

Teachers may teach a content that may not have an impact on the learner either because it doesn't suit the learner's age, or likings or their needs and abilities. Teachers may teach something that is not relevant to all social and family backgrounds.

Teachers may not distinguish between science itself and scientific knowledge and information.

Lessons of science may not have a continuity or complementarity and with what has preceded or with other school subjects.

Some scientific lessons are not organised and are hard to review. They may not be proved or experienced by learners.

Parents lack the enthusiasm to follow and check after their kids.

Learners may be interested more in memorising than understanding.

### **Conclusion.**

In fact, Education is a network of four poles : the content, the learner, the teacher and the institute.

Which of them comes first or in a word which of them is the centre. The whole process of Education is a human being-centred process. So information and knowledge and in our case : science knowledge, has to be adaptable to this human being's age and suitable to his liking , background and environment.

For a primary level it has to be primary and not sophisticated. It is the primary children's first step toward their skill to plan, deduce and produce.

When educators and education practitioners believe so, scientific curriculum will be based on a whole life of the child and within the whole school syllabus.

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### **FURTHER READING**

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