Institute for Education, Martin Luther King Road, Pembroke PBK 1990. Tel: +35625982001 | Email: ife@ilearn.edu.mt

BPRI411 Science for the Primary Classroom

ECTS Value: 8 ECTS

Overall Objectives and Outcomes

The module's aim is to develop knowledge and understanding of the basic principles of physics, chemistry and biology as appropriate to the Primary Science curriculum. The focus is to present the science as a series of themes through which the basic sciences are covered in a holistic, interlinked manner. Throughout this module, the emphasis is to maintain links and connections to everyday scientific phenomena as well as to focus on the local context. This will include an analysis of both the primary science syllabus and the current primary science textbooks which are utilised locally.

The module unit content will include the following broad areas:

i. An Introduction to Primary Science
ii. The human body
iii. The diversity of life
iv. Local and Global Ecosystems
v. The Dynamic Earth
vi. Atmosphere, Oceans and Land
vii. Weather and Climate
viii. The Solar System and Beyond
ix. The nature of matter
x. Rocks and Minerals. (Including uses and properties of materials).
xi. Energy and Forces
xii. Light and Sound
xiii. Electricity and Magnetism
xiv. Science and the environment
xv. Important sites for Fieldwork activities and Investigations (including Natura 2000 sites, MPA's, power station

By the end of this module, the learner will be able to:

Competences

a. organise and outline the respective science topics in the area of physics, chemistry and biology;
b. plan primary science lessons that align objectives, methods, and assessments;
c. synthesize concepts in science and apply these concepts to the teaching of science in the primary;
d. use diverse resources to support effective teaching of science;
e. design and carry out effective field and classroom activities that engage students to be involved in science;
f. devise suitable investigations related to topics in Primary Science;
g. discuss common science misconceptions held by children and be able to utilize strategies to minimize and remove such misconceptions.

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Knowledge

a. critically analyse a wide variety of approaches and content organisation of areas in primary science. Students will be able to evaluate notions of the importance of science at this level and assess Eurobarometer studies on science across Europe and the wider global region;
b. describe and show scientific understanding of the human body: including cells, tissues, organs & systems, main body organs and systems, eating a balanced diet, teeth structure and health;
c. analyse the characteristics of living things and the seven vital functions;
d. apply taxonomy skills and the use of keys;
e. demonstrate an understanding of local and global ecosystems;
f. critically analyse fieldwork activities in Natura 2000 sites and MPA's;
g. demonstrate an understanding of the Dynamic Earth - interior earth structure and plate tectonics;
h. infer results from a seismograph;
i. critically analyse and link atmospheric composition, ocean pollution and land pollution;
j. measure and interpret readings from instruments that measure atmospheric and oceanic characteristics;
k. systematically understand weather and climate basic patterns and conditions;
l. appreciate the beginnings of the universe, galaxies, stars, planets and the solar system;
m. systematically understand key aspects of the nature of matter and important chemical equations;
n. critically evaluate classification of rocks and minerals, their everyday use in devices and their chemical and physical properties;
o. expand understanding of Energy and Forces including potential, kinetic, chemical, solar, wind, nuclear and Renewable and non-renewable sources of energy;
p. critically analyse the basic principles of light and sound;
q. measure and interpret readings of the speed of sound through air;
r. systematically understand electricity and magnetism including static and current electricity and parallel and series circuits;
s. systematically carry out experiments focusing on temporary and permanent magnets;
t. demonstrate an understanding of pollution issues, conservation issues, deforestation, global warming, ozone depletion and aquafer depletion;
u. create relevant fieldwork activities and investigations in Local Natura 2000 sites and Marine protected areas, electricity generation plants, sewage treatment plants and reverse osmosis plants.

Skills

a. utilise scientific skills and scientific instruments and make them accessible to all students;
b. understand, organise, plan and develop science-based lessons with the covered content;
c. engage students with the dynamic nature of science and its scientific method;
d. use a variety of scientific instruments and experiments to maximise student understanding;
e. support students in interpreting and building understanding and skill in science.

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Assessment Methods

This module will be assessed through: Practical Assignment(s)

Suggested Readings

Core Reading List:

1. DeRosa D., Abruscato J. (2014)., Teaching Children Science: A Discovery Approach, Enhanced Pearson eText with Loose-Leaf Version -- Access Card Package/Edition 8
2. Martin R., Franklin T., Gerlovich J., McElroy D., (2014)
3. Teaching Science for All Children: An Inquiry Approach (5th Edition)
4. Mifsud M. (2014), Environmental Science: A Maltese Perspective. Miller Publications, Malta. (pp. 478), ISBN 9789995737696

Supplementary Reading List:

1. Abrahams, I., & Reiss, M. J. (2012). Practical work: Its effectiveness in primary and secondary schools in England. Journal of Research in Science Teaching, 49(8), 1035–1055. https://doi.org/10.1002/tea.21036
2. Alake-Tuenter, E., Biemans, H. J., Tobi, H., & Mulder, M. (2013). Inquiry-based science teaching competence of primary school teachers: A Delphi study. Teaching and
3. Teacher Education, 35(2), 13-24.
4. Allchin, D. (2011). Evaluating knowledge of the nature of (whole) science. Science Education, 95(3), 518-542. doi:10.1002/sce.20432
5. Andersson, K., & Gullberg, A. (2014). What is science in preschool and what do teachers have to know to empower children. Cultural studies of science education, 9(2), 275-296.
6. Diamond, B. S., Maerten-Rivera, J., Rohrer, R., & Lee, O. (2013). Elementary teachers' science content knowledge: Relationships among multiple measures. Florida, Journal of Educational Research, 51, 1-20.
7. Fuentes, S. Q., Blooms, A. M., & Peace, H. (2014). Teaching science and mathematics: Preservice teachers' perceptions of knowledge needs. Journal of College Science
8. Teaching, 43(3), 30-35.
9. Hoffman, P., & Ralph, M. A. L. (2013). Shapes, scents and sounds: Quantifying the full multi-sensory basis of conceptual knowledge. Neuro-psychologia, 51(1), 14-25.
10. Kramer D. (1989). Animals in the Classroom: Selection, Care, and Observations. Menlo Park, Calif.: Addison-Wesley, 234 pp.
11. Mifsud M. (1999), Close-ups of Maltese Flora and Fauna. Media Centre Publications, Malta. (pp. 161), ISBN 99909 2 034 6.
12. Mifsud M. (2003), Maltese Nature in Focus. Mireva Publications, Malta. (pp. 281), ISBN 1-870579-44-5
13. Schembri P.J., (1992). Ilma, Blat u Hajja, Malta University Services Limited Ventura F., (1993). Science and Environmental Education at the Primary level in Malta: separate interests, different roles. International Journal of Science Education 15, pp.-509-519.
14. Harlen W., Qualter A, (2009), The Teaching of Science in Primary Schools, London: David Fulton Publishers.