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INQUIRY BASED LEARNING IN PRIMARY EDUCATION: A CASE STUDY USING MOBILE DIGITAL SCIENCE LAB

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Content

- Educational Problem & Objectives
- Inquiry Based Learning Scenario
- Science Education using Labdiscs
- Conclusions

Lesson (Meta)data

- Physics
- Primary Education (6th Grade)
- Unit → Ecosystems
- Duration → 3 hours & 30 minutes





The educational problem

The understanding of the ecosystem concept is a difficult issue for students. Many students believe that ecosystem refers only in living organisms (biotic organisms). It is important to help students understand that beyond the biotic organisms the ecosystem depends also on the abiotic factors such as temperature, humidity, soil structure etc.



Educational Goals



Knowledge:

- to report the elements including the ecosystem.
- to indicate some effects of human impact on ecosystems
- to relate the human factor to the world increase of temperature.

Skills :

- to verify experimentally the difference in temperature and humidity between ecosystems.
- to find differences in temperature and humidity in the same ecosystem different times,
- record temperature and humidity using Labdiscs

Attitudes :

- to develop positive attitudes towards the use of scientific methodology for valid results
 - to understand the concept of the ecosystem and sensitizes students for the importance of proper management of ecosystems
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Inquiry Based Learning Scenario

Inquiry Based Learning Scenario

- The existence of students' primary ideas concerning the ecosystems has led us to the selection of the Guided Research Teaching Model (Schmidkunz & Lindemann, 1992)
- This model has been adopted in the curricula of several primary schools in Greece and Cyprus and it is considered as optimal choice (Sotiriou et al. 2010).



Stage 1: Introduction-Stimulus-Hypothesis Formulation

Stage 2: Experimental approach of the task

Stage 3: Inference

Stage 4: Consolidation – Generalisation

Step 1

Introduction – Stimulus - Hypothesis Formulation



1st activity

Students attend an introductory video which presents different types of ecosystems at different time periods.



5'

2nd activity

After that, students work in groups of three or four formulating research hypotheses regarding the variations of temperature and humidity because of the human intervention in different ecosystems.

Students record their hypotheses on a worksheet which has been created and edited by the teacher.



15'

Step 2

Addressing the problem experimentally



3rd activity

Students conduct experiments in groups to test their hypotheses.

- Each group uses the Labdiscs to measure the temperature and humidity in the centre of the schoolyard taking rates concerning the school ecosystem.
- They also measure the temperature and humidity of the water at the nearby seashore.
- They make measurements of temperature and humidity respectively at the mountainous ecosystem.



1 hour &
45 minutes

Step 2

Addressing the problem experimentally

4th Activity



- The results of the measurements are discussed so that the changes in measurements in each ecosystem at different times during the day are put forth.
- Each group is given an evaluation sheet with a semi-structured conceptual map where students are asked to fill in keywords.
- Enable students to match their measurements to those ecosystems, understanding their different characteristics.



60'

Step 3

Drawing Conclusions

5th Activity “Conclusions”



Groups summarise their recordings through classroom discussion, reach their final conclusions and record them on the worksheet. These relate to: (i) the diversification of the temperature and humidity rates between ecosystems, (ii) the diversification at the different times of the measurements.



30'

6th Activity “Feedback”



The teams return to their initial hypotheses that were made at the first stage with the help of the teacher and they check - correct - fill in where needed. Then they justify their answers.



15'

Step 4

Consolidation - Genaralisation

7th Activity “Everyday Life Connection”



Students are asked to connect their measurements to everyday life. Each group responds to short-answer questions (worksheet) plucked from everyday life concerning the variability of the temperature and humidity measurements.



10'

8th Activity “Peer Evaluation”

- Each group swaps worksheets with another group which is randomly selected- and proceeds to the evaluation of responses, justifying only the wrong answers.
- Students go on to check peer-assessment through class discussion with the assistance of the teacher and its final finding is readjusted accordingly.



15'

Step 4

Consolidation - Genaralisation

9th Activity “Rubric Evaluation”

- The assessment of the worksheet is achieved with the help of rubric that evaluates the credibility and complement of answers.
- Students are provided with a clear guide for grading the worksheets depending on the importance of each criteria.
- Teacher discusses and specifies the right answers and the teams check their initial estimates



10'

10th Activity “Evaluate individual performance”



- Each student fills in, individually, a test with multiple choice questions, matching activities, right or wrong and short answers through which their individual performance is evaluated
- The teacher assesses the portfolios with the teams' worksheets and gives them a mark.



10'

Science Education Using Labdiscs

Science Education Using Labdiscs

Labdisc

It's time for something new

- The Labdisc is an interdisciplinary "digital lab" with application across the field of Natural Sciences
- It incorporates sensors that can replace traditional pieces of equipment by converting each class into a science lab.
- This solves the problem of inadequately equipped school laboratories, while minimizing the time needed to prepare a science course.



Science Education Using Labdiscs



Enviro: Take multidisciplinary approach to engage with the environment.

Primo: Make early inquiry learning science.

Physio: Discover the force of our universe.

Biochem: Explore chemical reactions and biochemical phenomena.

Gensci: Parallel real scientific processes and connecting real world core science concepts.

Conclusions



1. Students responded positively and with sheer enthusiasm towards utilizing Labdisc in their school
 2. Utilising Labdisc in multiple Inquiry Based Learning activities greatly improved the process of restructuring the students' primary ideas
 3. The teacher, by implementing a combination of contemporary assessment techniques, evaluated with as much completeness as possible the students' individual and team performance
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Thanks to:

The logo for SAILS (Strategies for Assessment of Inquiry Learning in Science) features the word "SAILS" in a bold, blue, sans-serif font. The letter "A" is stylized to resemble a sailboat's sail, with a white and blue gradient.

**Strategies for Assessment of
Inquiry Learning in Science**

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Thank you!

