

Course Unit	Didactics of Natural Sciences in the 2nd Cycle of Basic Education		Field of study	-	
Master in	Teaching of the First Cycle, Mathematics and Natural Sciences in the Second Cycle		School	School of Education	
Academic Year	2023/2024	Year of study	2	Level	2-2
Type	Semestral	Semester	1	ECTS credits	5.0
Code	5044-763-2102-00-23				
Workload (hours)	135	Contact hours	T -	TP 35	PL -
			TC -	S -	E -
			OT 10	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Paulo Miguel Mafra Gonçalves

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Explain the theoretical foundations of Learning by Reception; Learning by Discovery; Learning in Social Interaction, as well as the meaning of Meaningful and Mechanical Learning.
2. Debate the theoretical foundations of behaviorism, cognitivism, constructivism and socio-constructivism in their relationship learning and teaching of sciences.
3. Discuss the need to develop a teaching/learning process that consider the different dimensions of science (psychological, sociological, historical, etc.).
4. Discuss contributions to the success of students with the approaches CTSA (science, technology, society, environment); Problem-Based Learning (PBL) and Cooperative Learning CL).
5. Justify ways to plan, conduct and evaluate experimental, laboratory and practical's tasks.
6. Design, implement and evaluate diversified activities (practical/experimental, discussion, problem solving, etc.) to teach sciences.
7. Produce, implement and evaluate tools for assessing student learning.
8. Analyze recent research in the sciences and reflect on the importance of analysis of school textbooks.

### Prerequisites

Before the course unit the learner is expected to be able to:  
No pre-requisites.

### Course contents

1. The issue of learning and teaching in the 2nd cycle of basic education.
2. Design, implementation and evaluation of activities adapted to the 2nd cycle of basic education.
3. Assessment in the 2nd cycle of ensino básico.
4. Analysis of textbooks of Natural Sciences of the 2nd cycle of basic education.

### Course contents (extended version)

1. The problematic of learning and teaching in the 2nd cycle of basic education:
  - Curricular guidelines for basic education - Fundamentals and objectives;
  - Learning theories and teaching models of science (From transmission To the research);
  - Cognitivism, constructivism and socioconstructivism in the learning of sciences in basic education;
  - Learning by Reception, Discovery and Social Interaction - Concept and implications.
  - Meaningful and Mechanical Learning.
  - CTSA (science, technology, society, environment) approach. Contributions to the success of students;
  - Learning Based on Problem Solving - Assumptions and methodologies;
  - The Cooperative Learning as a methodology of work to the 2nd CEB - Theoretical foundation;
  - Teaching by projects on the 2nd CEB - Objectives and implementation steps;
  - Discussion of the results of recent research within the teaching of science.
2. Design, implementation and evaluation of activities adapted to the 2nd cycle of basic education:
  - Discussion activities, problem-solving activities and practical/experimental activities;
  - Some methods of cooperative learning;
  - Activities for the CTSA approach in the classroom.
  - Field activities in Science Teaching.
  - Games and learning.
3. The assessment in the 2nd cycle of basic education:
  - Assessment of cognitive, procedural, attitudinal and communication skills;
  - Design assessment tools adapted to the 2nd cycle of basic education.
4. Analysis of textbooks of Natural Sciences 2nd cycle of basic education.

### Recommended reading

1. Coll, C. et al. (2001). O construtivismo na sala de aula: Novas perspectivas para a acção pedagógica. Edições ASA.
2. Fernandes, I., Pires, D., & Delgado-Iglesias, J. (2017). Ciência-Tecnologia-Sociedade-Ambiente nos documentos curriculares portugueses de ciências. Revista Cadernos de Pesquisa, 47 (165), 998-1015.
3. Lopes, J., & Silva, H. (2009). A aprendizagem cooperativa na sala de aula: Um guia prático para o professor. LIDEL.
4. Pires, D. et al (2004). Desenvolvimento científico nos primeiros anos de escolaridade: Estudo de características sociológicas específicas da prática pedagógica. Revista de Educação, XII (2).
5. Tenreiro-Vieira, C., & Vieira, R. (2013). Estratégias de ensino e aprendizagem e a promoção de capacidades de pensamento crítico. Enseñanza de las Ciencias, n.º Extra. 3685-3690.

### Teaching and learning methods

The course has a strong reflective, interactive and practical component. Although some classes having a theoretical nature, in which the presentation of content is made by the teacher, there will be opportunity to perform reflections, presentations and discussions on topics of the course, as well as various activities adapted to elementary school students.

### Assessment methods

1. Continuous Assessment. - (Regular, Student Worker) (Final)
  - Intermediate Written Test - 50% (Realization of a written test.)
  - Work Discussion - 50% (Works/reflections (with presentation to the class) about didactic themes foreseen in the program.)
2. Assessment by Exam. - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 50% (The final exam concerns to the content of the written test.)
  - Work Discussion - 50% (works/reflections about didactic themes foreseen in the program (continuous assessment).)

Language of instruction

Portuguese

Electronic validation

Paulo Miguel Mafra Gonçalves	Adorinda Maria Rodrigues Pereira S. Gonçalves	Manuel Celestino Vara Pires	Carlos Manuel Costa Teixeira
14-02-2024	14-02-2024	14-02-2024	18-02-2024

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