Universitat Autònoma de Barcelona

2021/2022

Designing STEM Project for the Primary School Classroom

Code: 105055
ECTS Credits: 6

Degree	Type	Year	Semester
2500798 Primary Education	OT	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Bernat Rios Rubiras

Prerequisites

It is recommended to have pass the scientific and mathematical courses of the degree. In concrete:

- Mathematics for Teachers
- Learning Mathematics and the Curriculum
- Teaching and Learning about the Natural, Social and Cultural Environment
- Teaching Experimental Sciences
- Management and Innovation in the Mathematics Classroom

Objectives and Contextualisation

The approach of the subject within the curriculum of primary school teachers aims to introduce and deepen the tools for the design and evaluation of teaching and learning sequences, projects and classroom nooks in the field of mathematical and / or scientific education.

Scientific and mathematical ideas (what we call school science and mathematics content) and approaches for the teaching of science and mathematics (such as modeling and scientific and mathematical argumentation, the role of language, the importance of contextualization, etc.) that have been learned in the compulsory subjects of science and

mathematics in the primary education degree will be used to design and plan both the implementation and evaluation of innovative classroom activities and teaching and learning sequences within acompetence-based framework.

From a view of teaching and learning of both science and mathematics as participation of scientific andmathematical practice, the aim is to plan and evaluate activities where pupils can think, do and talk scienceand mathematics in the classroom, that is, to promote scientific and mathematical modelling, scientific inquiryand mathematical problem-solving, and / or argumentation of science and mathematics, with pupils reflecting on the nature of scientific and mathematical activity emcompased in these activities

From a view of learning as a progression of knowledge and competence throughout schooling, design andsequencing of learning arises at the level of conversation, meeting, teaching unit, course and school staging,using the ideas of the learning cycle and learning progression to guide the teaching action.

From the point of view of evaluation as regulation of learning, evaluation is presented as integrated into theprocess of teaching and learning, where the promotion of metacognition and self-regulation in students isconsidered essential and is promoted through the use of strategies innovative assessment such as co-avalaució and self-evaluation and sharing of design assessment rubrics.

Finally, from a competence-based framework in which the teaching and learning of science and mathematicsallows to "act" in the world (that is, to think, argue, decide, evaluate, etc. with and mathematicalscientificknowledge), these activities and teaching and learning sequences must be contextualized in appropriatecontexts of personal, social or global relevance to students.

The objectives of the course are:

1) Deepening inquiry, problem solving, modeling and argument (do, think and speak) as scientific andschoolmathematical and planning and evaluating teaching and learning activities that integrate both.practices

2) Designing and evaluating sequences of teaching and learning activities, projects, nooks, ... according to the ideas of learning cycle progression and knowledge to micro and macro levels of scientific-mathematical field.

3) Propose and evaluate evaluation activities from the perspective of the evaluation and regulation of learning.

4) Justify and use contexts of teaching and learning appropriate for teaching science and mathematics andrelevant for students from the personal, social or global viewpoint.

Competences

- Design and regulate learning spaces in contexts of diversity that take into account gender equality, equity and respect for human rights and observe the values of public education.
- Design, plan and evaluate education and learning processes, both individually and in collaboration with other teachers and professionals at the centre.
- Develop the functions of tutoring and guidance of pupils and their families, attending to the pupils own needs. Understand that a teachers functions must be perfected and adapted in a lifelong manner to scientific, pedagogical and social changes.
- Foster reading and critical analysis of the texts in different scientific fields and cultural contents in the school curriculum.
- Know and apply information and communication technologies to classrooms.

- Know the curricular areas of Primary Education, the interdisciplinary relation between them, the evaluation criteria and the body of didactic knowledge regarding the respective procedures of education and learning.
- Make changes to methods and processes in the area of knowledge in order to provide innovative responses to society's needs and demands.
- Reflect on classroom experiences in order to innovate and improve teaching work. Acquire skills and habits for autonomous and cooperative learning and promote it among pupils.
- Work in teams and with teams (in the same field or interdisciplinary).

Learning Outcomes

1. Analyse a situation and identify its points for improvement.
2. Identify situations in which a change or improvement is needed.
3. Identifying aspects common to all the experimental sciences and examining them in depth.
4. Identifying, describing, and analysing the characteristics pertaining to management of the area of experimental sciences in the classroom, and the implementation of activities involving experimentation and the use of CLTs.
5. Knowing how to communicate and present an argument in science lessons.
6. Produce and apply resources related to the teaching and learning of experimental sciences.
7. Propose new methods or well-founded alternative solutions.
8. Propose new ways for measuring success or failure on implementing innovative proposals or ideas.
9. Relating science with its technological applications, with its social impact on the didactic situations pertaining to the school.
10. Weigh up the risks and opportunities of both ones own and other peoples proposals for improvement.

Content

The approach of teaching and learning as participation to school scientific and mathematical practice in the primary school classroom.

The approach to evaluation as regulation of learning

The sequencing of teaching and learning following a learning progression

The importance of contextualisation in the teaching and learning of Science and Mathematics

The structrue of STEM education projects for the primary school

Methodology

The main actor in the educational learning process is the student. It is under this premise that the has been planned:methodology

- Teacher lectures about the basic contents of the subject to the whole class group in an interactive way.

- Teaching and learning activities to reflect, follow, create, etc will be included to be done at personal or smallgroup level "in situ".

- Directed activities that could include lab work sessions, use of ICT's and oral presentations of students'productions. It includes the preparation and staging of micro-teaching episodes with self- and co-evaluationtasks of final productions.

- Autonomous or supervised activities where students will need to elaborate tasks related with the lectures andthe activities done in the classroom. In concrete, the students will have to desing a complete teaching andlearning sequence.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Brief lectures and guided activities in the classroom	45	1.8	6, 3, 4, 9, 5
Type: Supervised			
Superivision of designed activities	30	1.2	6, 3, 4, 9
Type: Autonomous			
Final desing of TLS, preparation of microteaching, reflection, final presentation, co-evaluation	75	3	6, 3, 4, 9, 5

Assessment

The summative evaluation of the course includes both group and individual activities. In order to pass the student will have to get over a 4 in both the individual and the group marks.

Block 1. Group work:

- A complete Teaching and Learning sequence (including justification, activities designed to the level of the student and a teaching guide). Students must include a signed document showing how the distribution of thegroup work has been done.

- Oral presentationof the Teaching and Learning Sequence designed by group (teacher will decidepresentation order if necessary)

Block 2. Individual work:

- A self-assessment of the didactical quality of their micro-teaching activity

- A co-assessment of another groupTeaching and learning sequence (TLS) justified according to an evaluation rubric designed by the ech student themselve according to pre-established evaluation criteria throughout thecourse.

Specifically, the percentage of each of these tasks in the global mark of the subject is as follows:Workgroups

• 40% of the mark is the mark of the TLS (75% graded by the teacher and 25% by students' self-evaluationreport). TLS will be presented during the three last weeks of the course

• 10% note of the presentation of the UD (100% grade by teacher). TLS will be presented during the three last weeks of the course

Individual work

•25%ofself-assessmentreport of their micro-teaching activity (2 weeks after microteaching, each group willhave a different date from october to november)

•25%note of theco-assessnent rubric of the TLS ofanother group(criteriaof goodUD) Two weeks after the TLS are presented.

The evaluation activities will be delivered preferrebly via VirtualCampus. Other possibililities will be discussed ,if necessary, and informed both presentially and via Virtual Campus.

Feedback to all evaluation activities will be done before a month after their submission.

80% of attendance is compulsory.

To pass the course each student should pass each of the individual and group evaluation blocksindependently.

The microteaching report to evaluate individually could be done again, if failed, by submitting a new proposal during the intersemestral week.

Our teaching approach and assessment procedures may be altered if public health authorities impose new restrictions on public gatherings for COVID-19

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Group productions	50%	0	0	1, 6, 3, 2, 4, 9, 5
Individual work: co-evaluation of another group designed TLS	25%	0	0	1, 6, 4, 10, 7, 5
Individual work: reflection on the microteaching activity	25%	0	0	6, 4, 8, 5

Bibliography

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Software

Microbit