Co-funded by the European Union

STEAM FOR SUSTAINABILITY

Basic information

The course aims to foster the acquisition of the basic fundamentals and main theoretical approaches related to the sustainable development education, the outdoor education, the STEAM approach, and the importance of learning through play as well. Moreover, consistently with the new empirical evidence, the course aims to provide operative tools to be applied during pre-scholar childhood.

The course foresees 30 hours of synchronous lessons, for a total of 3 CFU.

In addition to traditional teaching methods such as lectures and practical exercises, the course also includes active learning methods such as: STEAM challenges, experiments in an integral sustainable way, scientific observation, learning through inquiry, visual note's taking, storytelling, use of educational videos from the project website, cooperative learning and project method.

Methods will be chosen to develop key cross-cutting competencies related to sustainability such as system thinking, anticipatory thinking, normative competency, strategic competency, cooperative competency, critical thinking, self awareness and competency in solving integrated, multidisciplinary problems.

Learning objectives

At the end of the course, students will be able to:

- Explain the main theories and models related to the sustainable development education, the outdoor education, the STEAM approach, and the learning through play,
- Analyse the developmental needs and tasks related to childhood with a specific focus on the importance of playing – especially in contact with the nature – as a means to learn,

- Apply the operative tools to conduct transformative education,
- Develop and design new learning units or learning pathway related to sustainable education

Course rationale

This course offers to students a theoretical and practical understanding of sustainable development education, outdoor education, STEAM approach and learning through play at the pre-school level, providing them a holistic perspective.

Contents

1. *Sustainable development*: The first module involves the study of the founding theoretical models of environmental education, and the framework of AGENDA 2030 as well. Moreover, there will be presented methodologies and techniques for teaching sustainable development at the preschool level, through hands-on activities, games and stories.

   Some contents might include:

   - The concept of sustainability and the three pillars,
   - Framework of Agenda 2030 and Sustainable Developmental Goals (SDGs),
   - UNESCO documents,
   - Educational methodologies to reach the SDGs

2. *Outdoor education*: The second module focused on the various ways in which outdoor activities can be used to support learning, personal development, and social engagement. The module will involve a combination of classroom-based learning and hands-on outdoor activities.

   Some contents might include:

   - The origins of outdoor education (e.g., Montessori),

- The Essence of Outdoor Education;
- Seven principles of outdoor education
- Creating Outdoor and Indoor Spaces (Wilding Urban Spaces, equipment and materials)
- Community Mapping

3. *The STEAM approach*: The third module is based on ideas and activities for teaching STEAM in a creative and playful way at the preschool level, through practical activities and simple and accessible teaching materials. For example, coding activities for children, construction and engineering projects, and scientific experiments, STEAM challenges, and mathematical exploration activities using natural materials.

   Some contents might include;

   - Origins and meaning of STEAM education,
   - Core STEAM skills – what they are and why are important,
   - Mindset needed for Inquiry based learning approach - workshops presenting different methods: a/ experiments; b/ observation; c/ STEAM challenges; d/ using ICT tool for inquiry learning,
   - Interdisciplinary learning - solving interdisciplinary problem as a part of STEAM holistic approach,
   - Empowering teachers - process of learning/ experiencing as equally important as a result of learning

4. *Teaching and Learning through Relationships:* The fourth module focuses on learning about the foundational role of social relationships in the educational journey of preschool children. It emphasises play as a dynamic and relational educational tool highlighting how teachers can enhance their interactions with children.

Some contents might include:

- Socio-cultural theory of development
- Pedagogical strategies to enhance attuned interactions between teacher and a child
- The pedagogy of play
- Self assessment through video analysis

Assessment

- At the end of the course, students should develop a learning pathway composed of at least three learning units that encompass the concept of sustainability, environmental education and the STEAM approach to be applied at the preschool level. The activity will be carried out in small groups. Moreover, students will be asked to study the handbooks of the course.
- The examination will be oral and consists of testing knowledge of the course content, i.e. the textbook, the lecture slides that will be shared with the students and the group work produced. A pass mark is achieved with a score of at least 18 and the maximum mark is 30. Honours may be added to this mark if the student demonstrates mastery of the course content, presenting it with coherence and clarity and using critical reflection.

Recommended readings:

Brennan, C. (2008) Partners In Play: How Children Organize Their Participation In Sociodramatic Play. Dublin: Dublin Institute of Technology

Bybee, R. W. (2010). What is STEM education? Science, 329(5995), 996-996.

Campbell, C.; Speldewinde, C. Early Childhood STEM Education for Sustainable Development. Sustainability 2022,14,3524. https:// doi.org/10.3390/su14063524

Gaziulusoy, A,I. (2020) The experiences of parents raising children in times of climate change: Towards a caring research agenda, Current Research in Environmental Sustainability,Volume 2,

Gernhardt, S. (2004) Why Love Matters: How Affection Shapes A Baby's Brain. New York: Routledge

Kernan, M (2007) Play as a context for early learning and development. A research paper. Dublin: National Council for Curriculum and Assessment (NCCA).

O'Dea, B. (2021). Minister warns of skill shortage in key STEM industries. Silicon Republic. https://www.siliconrepublic.com/careers/minister-for-further-education-ireland-simon-harris-stem-skills-shortages

Spaen, L. (2018) STEM-ing Anxiety, Making the Grade: PBS Newshour https://www.pbs.org/video/why-teachers-need-support-to-spur-preschool-stem-education-1520380566/

Sobel, D. (1996). Beyond Ecophobia: reclaiming the heart of nature education. Great Barrington, M.A. The Orion Society

Supplementary

Dunphy, E. (2007) *Supporting Early Learning and Development Through Formative Assessment.* NCCA. Dublin: The Stationary Office

French, G (2019) Key elements of good practice to support the learning and development of children from birth to three. research paper commissioned by the National Council for Curriculum and Assessment.

Moyles, J. (2015) The Excellence of Play. maidenhead, Berkshire: Open University Press.

Sagastui Aguayo, J., Herrán Izagirre, E. and Anguera Argilaga, M.T. (2020). A Systematic Observation of Early Childhood Educators Accompanying Young Children's Free Play at Emmi Pikler Nursery School: Instrumental Behaviours and Their Relational Value.

Sroufe, A. (2000). Early Relationships And The Development Of Children. Infant Mental Health Journal. Vol. 21: (1–2) 67–74

Trevarthen, C. et al (2003) Review of Childcare and the Development of Children Aged 0–3: Research Evidence, and Implications for Out-of-Home Provision Supporting a Young Child's Needs for Care and Affection, Shared Meaning and a Social Place. Edinburgh: Scottish Executive