

## Overview

CASTeL undertakes research to enhance the teaching and learning of science and mathematics at all educational levels from primary to postgraduate. For almost two decades, CASTeL has been Ireland's largest research centre in STEM education, making significant contributions both nationally and internationally.

CASTeL's research focuses on 'the classroom and the lab' – on enhancing the impact of the full spectrum of teaching, learning and assessment activities in science, technology, engineering and mathematics. This means that our research encompasses the teachers and the students, curricula and assessment, and the education and assessment systems. We also draw on research world-wide in cognitive science and related areas to inform the design and implementation of our research projects. Based on the very diverse expertise of its members from across the STEM disciplines, CASTeL is leading the way in developing innovative and effective methods in STEM education.

Internationally, CASTeL is involved in many initiatives, particularly around inquiry-based learning. Here, problem-solving and experimentation draw on the curiosity and observations of learners, allowing them to make sense of the world through critical thinking and reflection.

CASTeL is committed to raising the awareness and attractiveness of STEM education and careers, and is dedicated to involving teachers, pupils and parents in the appreciation of STEM.

## Research Areas

CASTeL's research activities focus on:

- Evidence-based research on STEM curriculum, pedagogy and learning.
- Inquiry and innovation in STEM education practices and policies at all levels.
- Science and Mathematics Initial Teacher Education.
- Practitioner research and Continuing Professional Development.



## Why work with us?

CASTeL members work with a wide range of organisations, often lending their expertise in science and mathematics teaching, learning and assessment to a variety of STEM projects. The following examples illustrate the range of projects that CASTeL members are involved in.

### Meeting the challenge of assessing inquiry learning in science

The SAILS FP7-funded project led by CASTeL has facilitated science teachers to become confident and competent in the assessment of their students' learning through inquiry. More than 2500 science teachers in 12 European countries have benefited.

### Supporting teachers to integrate technology in the classroom

The Smartclass project, a partnership between Intel and CASTeL, has conducted research to support teachers and students integrating tablet technology in the junior cycle classroom.

### Promoting teaching and learning of Energy and Sustainability

CASTeL, through funding from SEAI, developed two national educational programmes that provide primary and second levels students with opportunities to develop their knowledge and awareness of energy usage, conservation and sustainability.

### Developing primary school teachers' pedagogical and conceptual knowledge of science and mathematics.

Researched and developed by the Royal Dublin Society (RDS) and CASTeL, RDS STEM learning is a continuing professional development programme with a difference - it is developed by teachers, for teachers for primary level.

### Facilitating Lesson Study in mathematics

The Lesson Study approach is being used to (a) develop preservice and qualified teachers' mathematical knowledge for teaching, (b) research primary/post-primary transitions in mathematics, and (c) facilitate school-based continuing professional development for mathematics teachers, at both primary and second level.

### Enhancing Undergraduate STEM education

CASTeL members collaborate to design and develop flexible teaching and learning sequences for university students. These programmes enable students to acquire deeper understanding and adopt expert-like approaches to problem-solving.

## Centre Members

### Dr. Eilish McLoughlin (Director)

Dr. Sandra Austin  
 Prof. Dermot Brabazon  
 Dr. Sinead Breen  
 Dr. Nicola Broderick  
 Dr. Deirdre Butler  
 Dr. Eamon Costello  
 Dr. Therese Dooley  
 Dr. Liz Dunphy

Dr. Odilla Finlayson  
 Dr. Lorraine Harbison  
 Dr. Penny Humby  
 Dr. Orla Kelly  
 Dr. James Lovatt  
 Dr. Thomas McCloughlin  
 Dr. Cliona Murphy  
 Dr. Eabhnat Ni Fhloinn

Dr. Siún Nic Mhuiri  
 Dr. Brien Nolan  
 Dr. Pat O'Malley  
 Dr. Maurice O'Reilly  
 Dr. Miriam Ryan  
 Dr. Greg Smith  
 Dr. Joe Travers  
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