PROTECT and Learning Scenarios

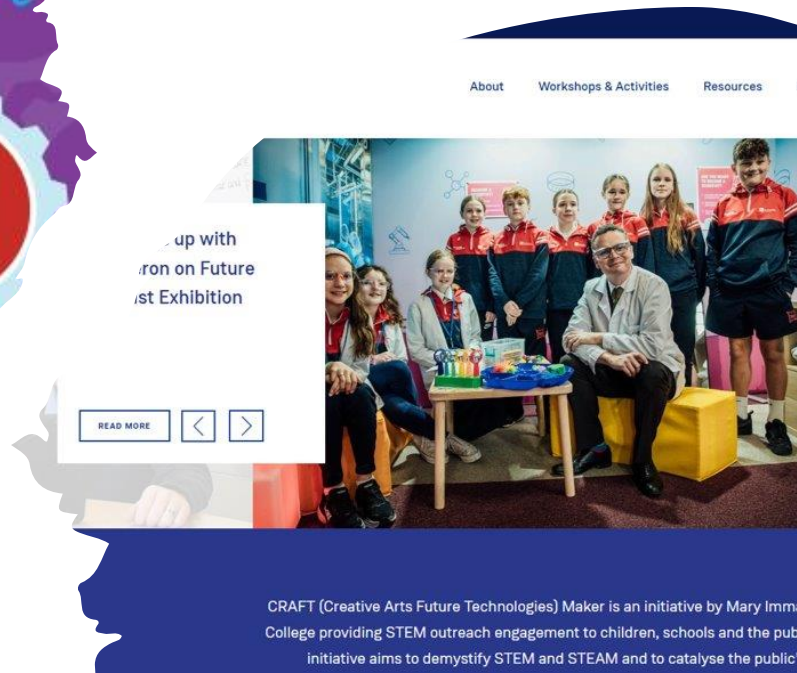
Brief background

Welcome

- MIC Founded in 1898
- Significant contribution to primary and secondary education in Ireland
- Approx 500 primary ITE graduates per year

Department of STEM Education in MIC (est. 2017)

- Exciting times in world of STEM Education
- Journey from 2017 to today
  - Policy
  - Curriculum changes
  - Projects



Overview of STEM Developments

STEM activities familiar to many of us from STEAMING

Integrated STEM – a step too far in primary education contexts?

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The focus on integrated STEM (Science, Technology, Engineering, and Mathematics) education that prepares students for an ever-changing society is gaining momentum. Recent STEM education research has concentrated on developing guiding principles for integrating STEM amid the lack of a unified definition and varied implementations of STEM integration. Aware of the challenges posed by the inconsistent language and lack of consensus on a common definition, we recognise the importance of educators developing a shared conceptual framework and co-constructing a vision for STEM education. This research reports on the STEM education perspectives held by key stakeholders in Irish primary STEM education. Using qualitative surveys and interviews, we investigate primary teachers' and teacher educators' conceptions of STEM education alongside their perceptions of approaches to and the efficacy of integrated STEM education. Insights are provided into how engagement in STEM education professional development programmes supports the development of understandings and practices. The research contributes valuable insights into the unique perspectives of primary education practitioners regarding balancing the affordances of integrated STEM alongside the perceived threat to content knowledge development within the discrete

STEM Findings

International Journal of Science and Mathematics Education
https://doi.org/10.1007/s10763-023-10361-2

'I Have Seen STEM in Action and It's Quite Do-able!' The Impact of an Extended Professional Development Model on Teacher Efficacy in Primary STEM Education

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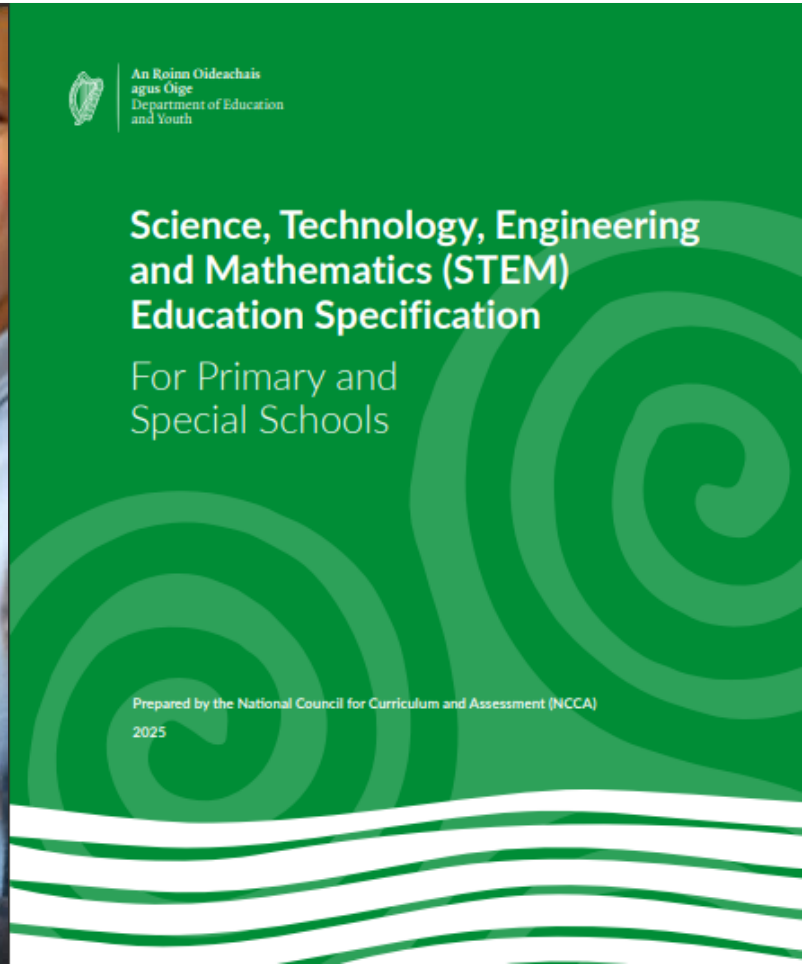
Abstract

Interest in Science, Technology, Engineering and Mathematics (STEM) has gaine
momentum due to increasing calls for a more STEM-literate society. As teachin
integrated STEM poses curricular and pedagogical challenges for most generalis
primary teachers, professional development (PD) is essential to support them t
develop appropriate knowledge and efficacy to teach STEM. This paper presents
qualitative study of 17 primary teachers, 2 school principals and the PD facilitato
It explores the perceived impact of a customised three-phase STEM PD program o
cher efficacy in STEM education using Bandura's (1977) sources of efficacy as a
ns. The findings illustrate how particular features of the PD model wer
buting to the development of participating teachers' performanc
sal, vicarious experiences and verbal persuasion. I
e developmental structure of the STEM PI
sing ownership for their STEM learn
EM education. Implications o
PD are discussed fully.

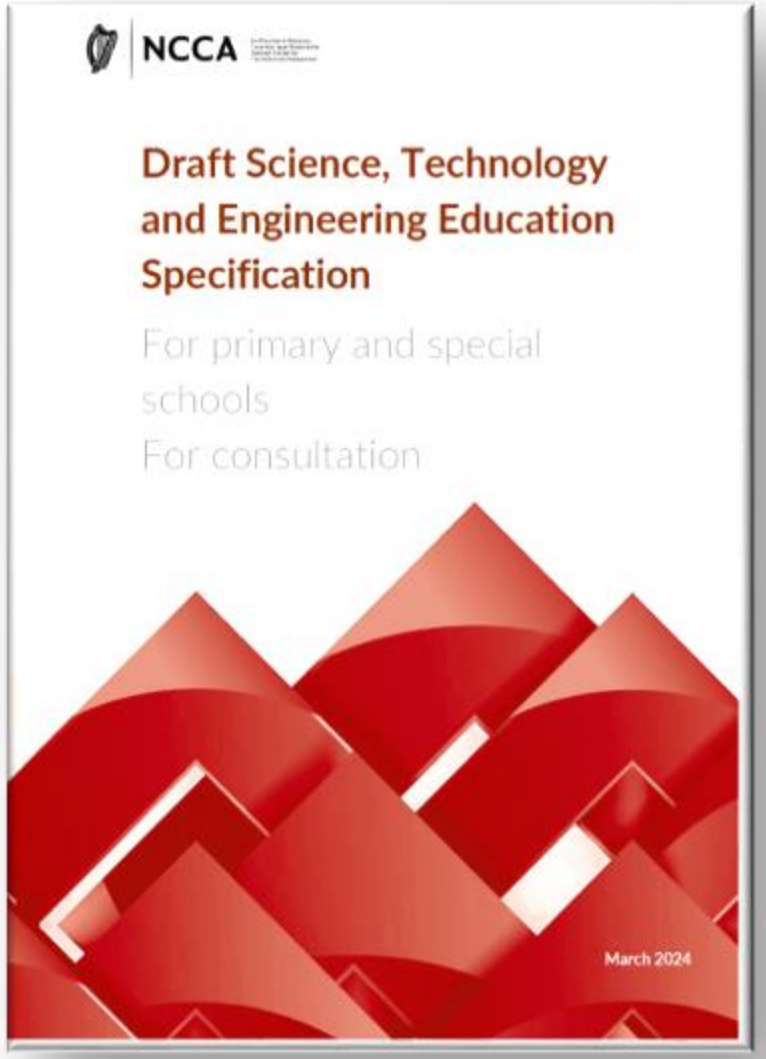
Now embedded in new STEM Specification

- STEM literacy
- Active problem-solving
- STEM with a conscience
- STEM mindset



A little about the new specification

STEM =



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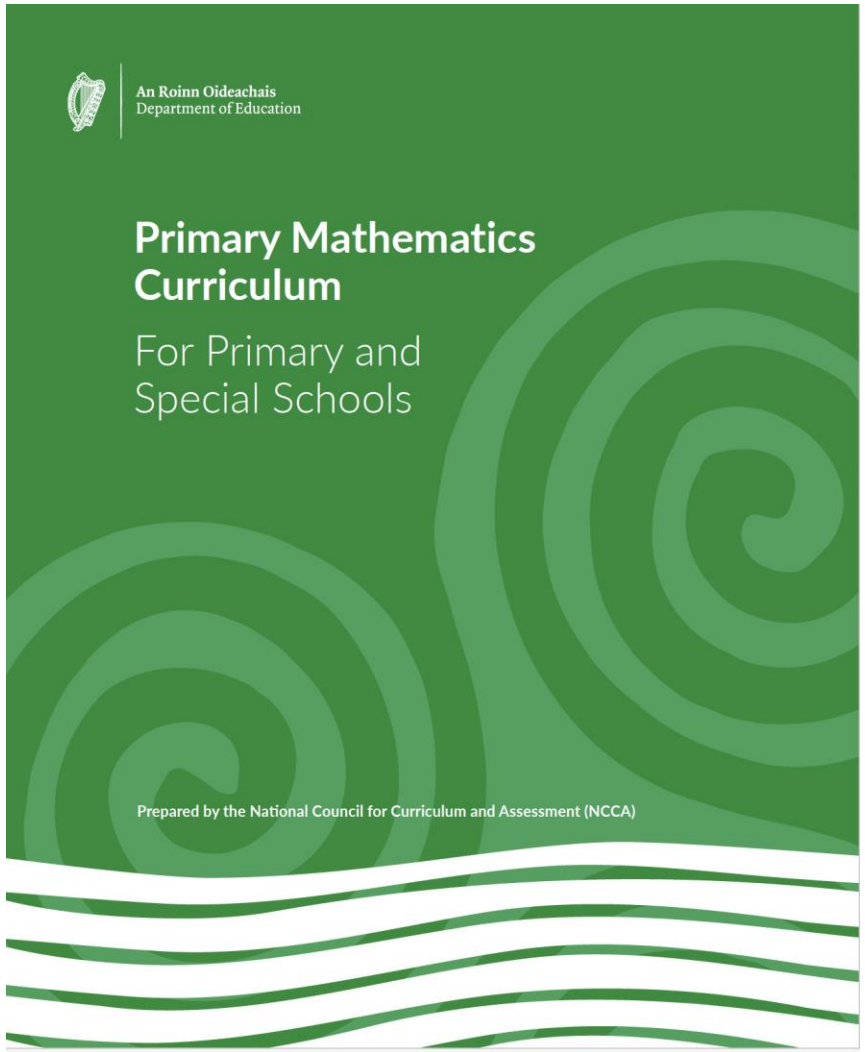


What is STE(M)?

Science, technology and engineering are continually evolving.

STE Education provides children with opportunities to explore, investigate and interpret our world and beyond.

Children learn that in light of new discoveries and technological advancements, problems can be solved, enabling rapid adaptability and changes to how we live in this world.

STE Education supports children in developing the knowledge, skills and dispositions required to make informed decisions about local, national and global challenges.

The wider benefits of learning in STE Education include building resilience, fostering creativity and nurturing the ability to engage in child-led critical inquiry and design.

Rationale

- Children are instinctively **curious** and are **natural investigators, designers and creators**
- STE provide us with a greater **understanding of our world**
- STE nurtures **real-world problem-solving skills**
- STE connects with **children's experiences and interests**
- STE **fosters agency** in children

Aims

The following aims describe a vision for children's learning in STE Education:

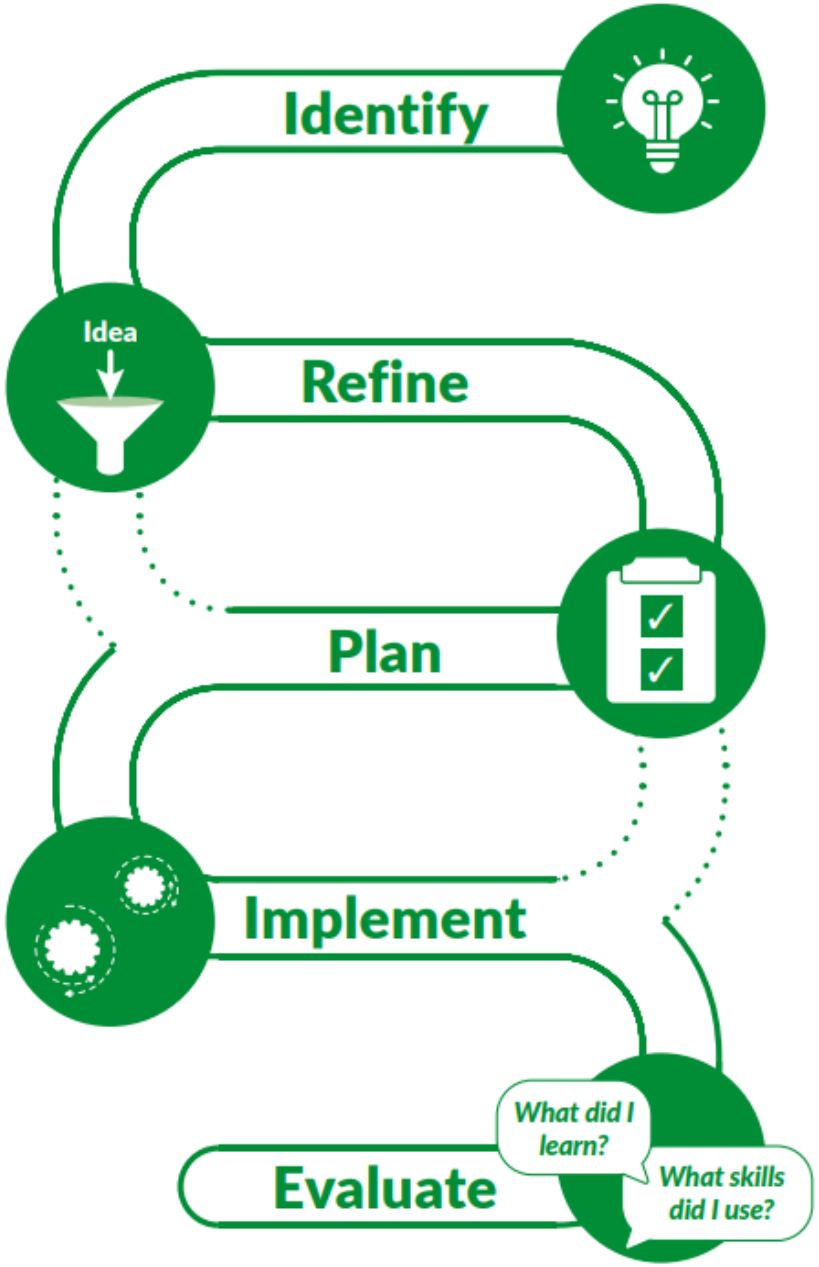
- Develop their Curious Disposition
- Develop STE Skills
- Build Conceptual and Procedural Understanding
- Create and Innovate
- Develop Critical Thinking
- Communicate Ideas and use Disciplinary Language

Strands

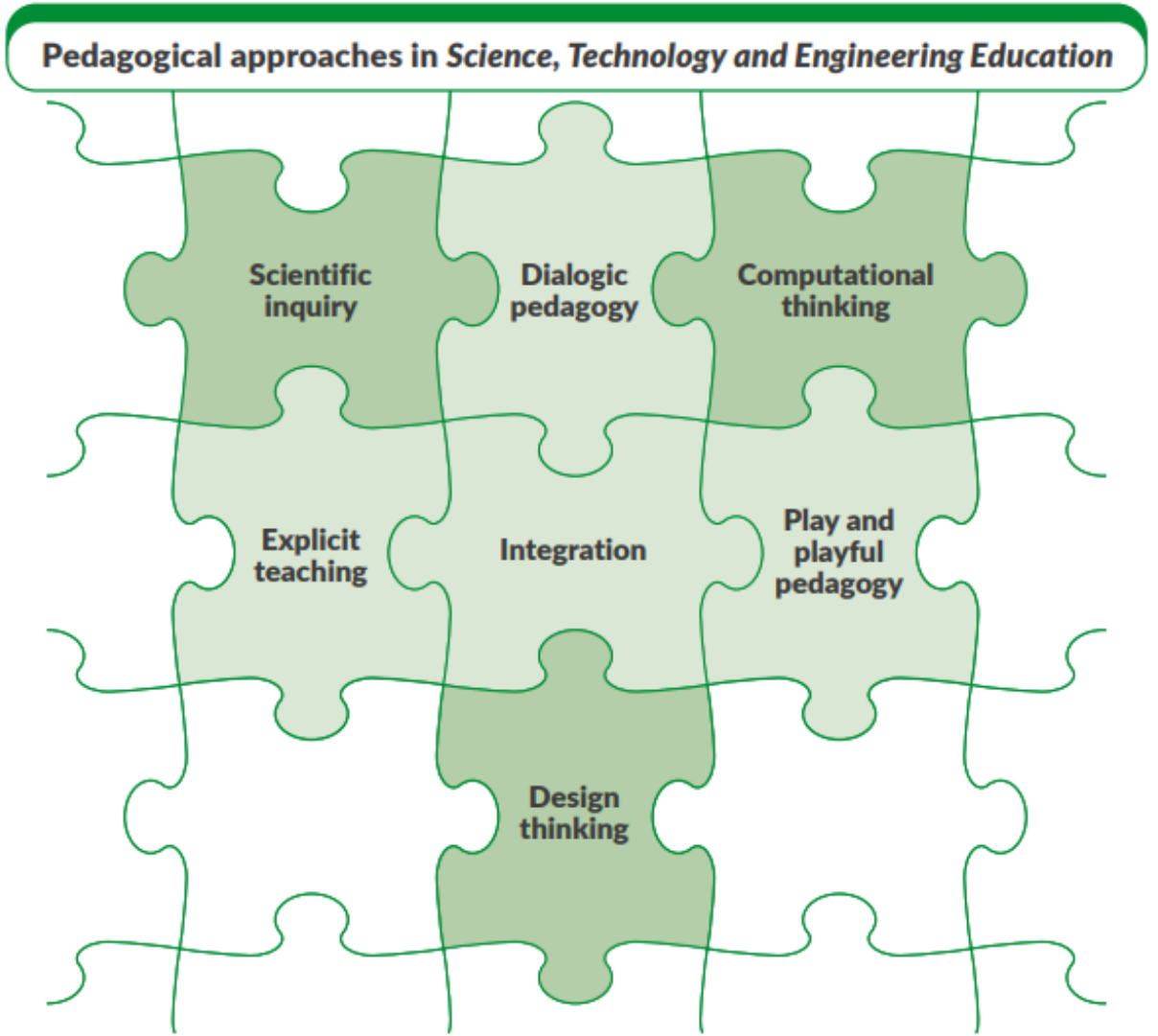
- Nature of STEM
- Energy and Forces
- Living things
- Materials
- Technology
- Engineering

Integrated STEM Learning

- STEM Literacy
- Active problem-solving
- STEM with a conscience
- STEM mindset



STEM Pedagogy



Menti

PROTECT Project

STEAM

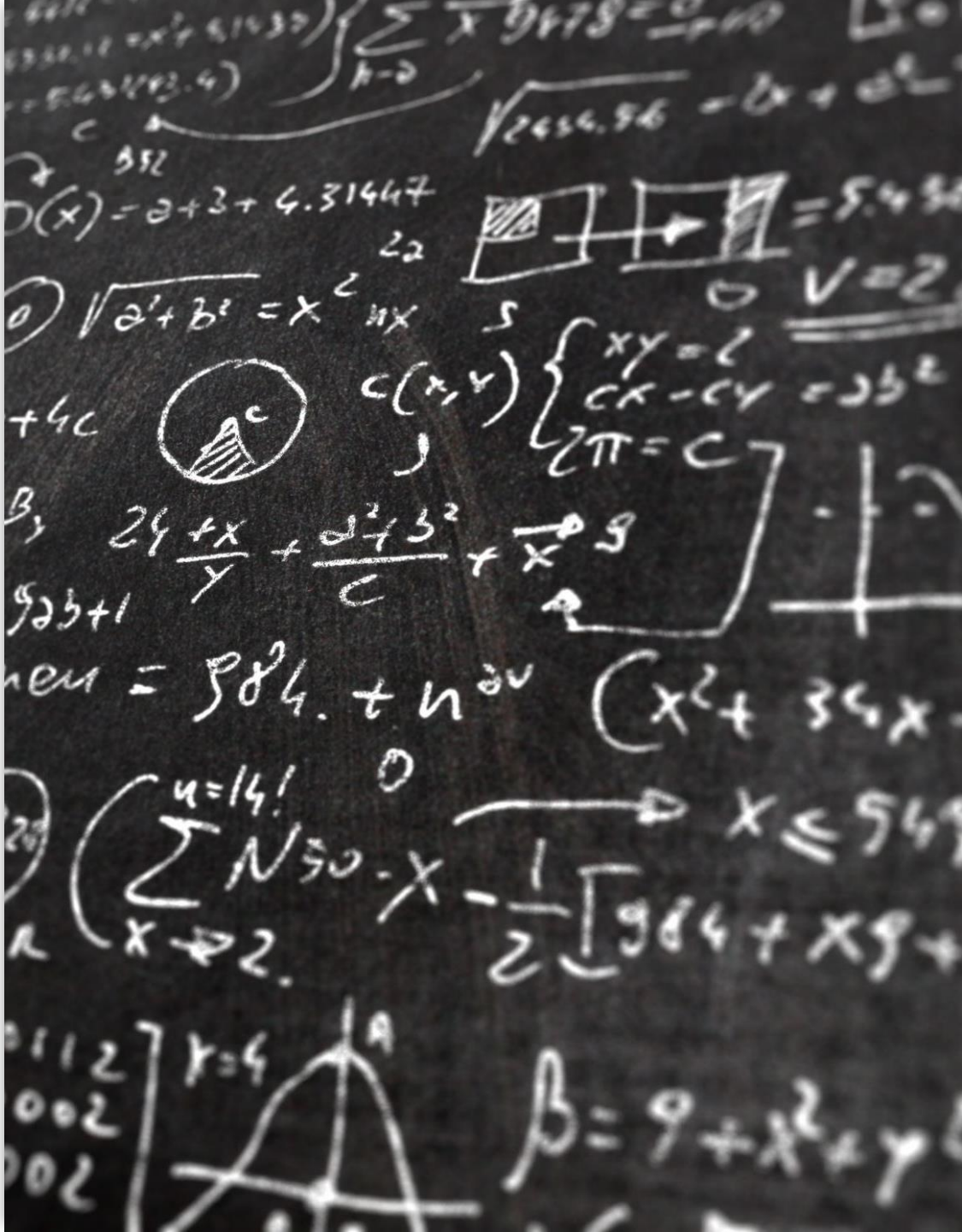
Climate Action

Child Voice

What is a Learning Scenario?

A **Learning Scenario (LS)** is a **teacher-designed educational blueprint**:

- It's more than a single lesson plan — it's a **mini curriculum unit** (several lessons or activities) that addresses a **real-world issue or question**.
- It deliberately **integrates multiple disciplines** (science, maths, technology, engineering, sometimes the arts or humanities).
- It's structured, but flexible — intended to be **adaptable** to different national curricula and classroom contexts.
- It is **shared in open repositories** so other teachers can reuse and remix them.



Origins and Purpose

- The **concept was systematised in Europe** through **European Schoolnet (EUN)**, particularly the **Future Classroom Lab** and later **STE(A)M IT (2019–2022)** project.
- The idea is rooted in **project-based learning** and **problem-based learning** traditions, but tailored to promote **integrated STEM teaching**.
- Learning Scenarios were meant to fill a gap: teachers asked for **ready-to-use, research-based, yet adaptable interdisciplinary units**.

Why They Matter

- **For teachers**: They provide concrete examples of how to move from abstract calls for “integrated STEM/STEAM” to actual classroom practice.
- **For research/policy**: They generate a growing, open library of “boundary objects” — concrete artefacts that show what integrated STEM can look like across countries.
- **For students**: They create motivating, authentic, problem-centered learning experiences.

- https://steamit.eun.org/category/integrated-stem-learning-scenarios/

Structure of a Learning Scenario

European Schoolnet and STE(A)M IT projects provide a template with the following elements:

- **Title and Author** (teacher who designed it)
- **Target group** (age/grade level, subject focus)
- **Real-life context/problem** the scenario addresses
- **Learning objectives** (STEM/STEAM curriculum links, skills like critical thinking, collaboration, creativity)
- **Sequence of activities/lessons** (step-by-step, inquiry, experiments, design projects, debates, digital tools, etc.)
- **Assessment strategies** (how learning will be evaluated—portfolios, presentations, self/peer assessment)
- **Cross-curricular connections** (e.g., art for visualising data, geography for environmental context, language for communication)
- **Resources and tools** (worksheets, online platforms, apps, datasets)

Learning Scenarios

Two examples

Erasmus+

STE(A)M IT

AN INTERDISCIPLINARY STEM APPROACH

EUROPEAN INTEGRATED STE(A)M FRAMEWORK

STE(A)M IT INTEGRATED LEARNING SCENARIO

A drop of water makes a difference

Music, Arts, Citizenship

Natural Sciences, Mathematics

USE IT IN YOUR CLASSROOM

Co-funded by the Erasmus+ Programme of the European Union

Funded by the European Union's ERASMUS+ programme, grant agreement 612845-EPP-1-2019-1- BE-EPPKA3-PI-FORWARD), and coordinated by European Schoolnet (EUN - the network of 32 European Ministries of Education), in partnership with Istituto Nazionale di Documentazione, Innovazione e Ricerca Educativa (INDIRE), Università Telematica degli Studi IUL, Ministry Of Science And Education Of The Republic Of Croatia, Ministério da Educação – Direção-Geral da Educação (DGE) and University Of Cyprus,the STE(A)M IT project is about creating and testing a conceptual framework of reference for integrated STE(A)M education, with a particular focus on the contextualization of STEM teaching, especially through industry-education cooperation. The creation of this learning scenario has been made possible thanks to the project's focus group of teachers who co-designed and tested the STE(A)M learning scenarios that will contribute to the overall STE(A)M framework. The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

European Schoolnet | INDIRE | Ministarstvo znanosti i obrazovanja | República Portuguesa – Educação | University of Cyprus | IUL

10-11 year olds

Aims

- Understand and raise awareness about water scarcity and the misuse problem.
- Work towards possible ways of solving it within the school community.
- Demonstrate that the problem identified in this LS can be assessed in different subjects like math, music, and natural sciences.

1	Citizenship (discuss water use at home, water wastage, availability in world)
2+3	Natural science (introduce water cycle, build water filtration device)
4+5	Mathematics (explore data about water misuse, water footprint, design survey)
6	Art (create 7 colours of the rainbow)
7+8	Music (build musical water glasses)
9	Trip to science museum in Porto and participate in hands on lab

DataScEd4CiEn

DATA SCIENCE EDUCATION IN STEAM FOR CIVIC ENGAGEMENT AND SOCIAL JUSTICE FROM THE EARLY YEARS

What is the true cost of your clothes?

Students engage in a design thinking process to explore the ethical, environmental, and economic issues behind the fast fashion industry. They empathize with those affected, define problems (waste, labour), ideate sustainable solutions, and prototype awareness campaigns or upcycled items, culminating in a public presentation.

Co-funded by the Erasmus+ Programme of the European Union

European University Cyprus

MIC Mary Immaculate College Limerick, Ireland

Hellenic Republic National and Kapodistrian University of Athens

Universität Münster

La Salle Buen Consejo Puerto Real

Real-Life Questions Driving Inquiry

General:	What is the true cost of our clothes, and what can we do about it?
Empathize:	What do we know about the fast fashion industry and its impact on people and the environment?"
Define:	What are the key problems caused by fast fashion in our school, community, and globally?
Ideate:	What actions or products can we create to reduce the negative impact of clothing consumption?
Prototype:	What awareness campaign, product, or design can we develop to promote sustainable fashion?
Test:	How can we share our ideas and creations to educate others and inspire change in our school community?

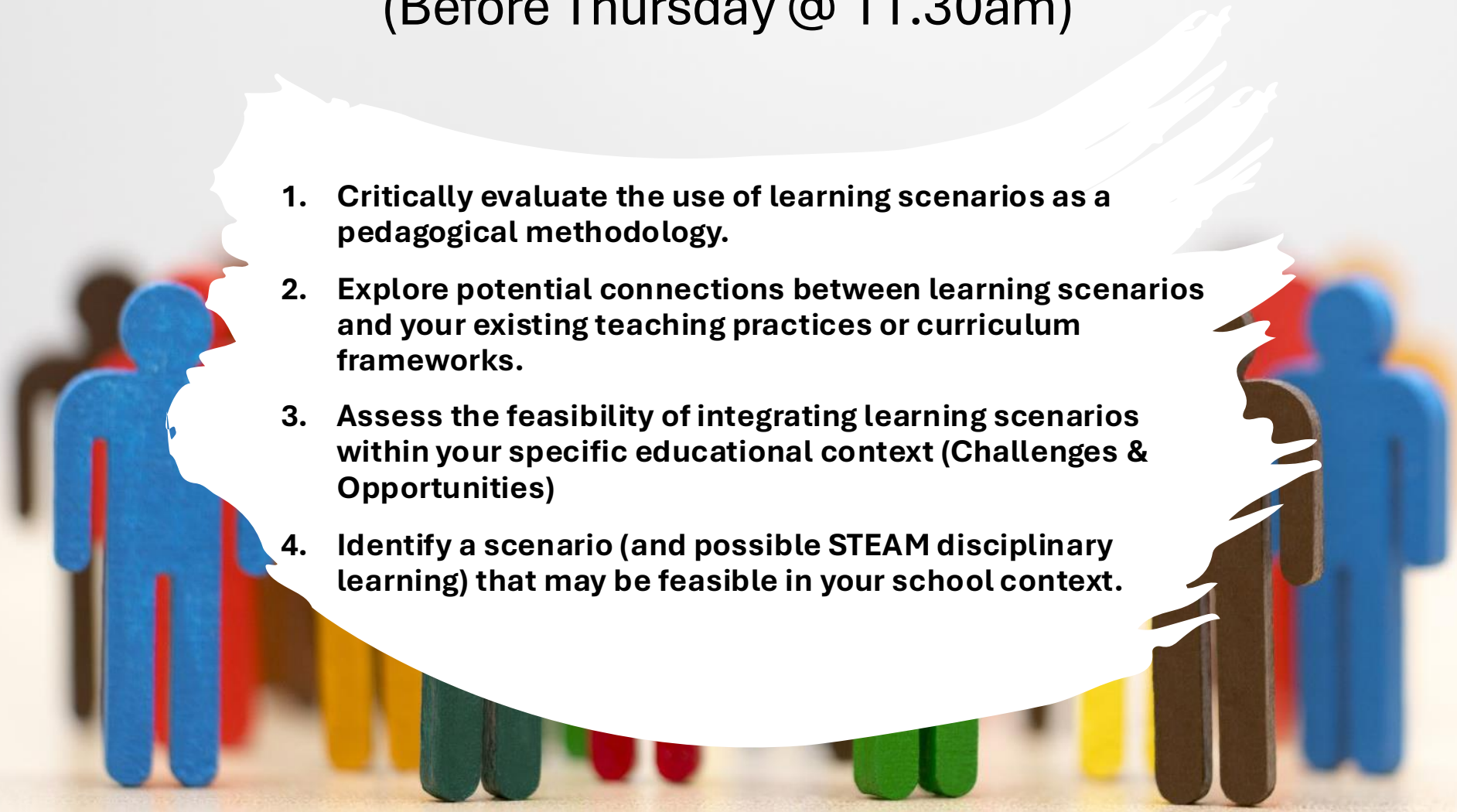
DataScEd4CiEn

1	Motivation – What is the true cost of your clothes?
2	Empathise – the human and environmental impact of fast fashion
3	Introduction to CODAP: Basic data moves [maths]
4-5	Calculation and interpretation of statistical measures [maths]
6	Creating a website to showcase the project
7	Video editing – creating awareness videos for the website
8	Investigating the environment footprint of school uniforms
9	Writing narratives to reflect on fast fashion
10	Designing for change: Instagram campaign to reduce clothing waste
11	Upcycling challenge - Giving clothes a new life
12	Presenting project outcomes

Some possible themes

- Can people suggest possible **Climate Action** themes from local region that are pressing or of interest?
- Opportunities around facilitating **Child Voice** in school?

In your Partner Groups….
(Before Thursday @ 11.30am)



1. **Critically evaluate the use of learning scenarios as a pedagogical methodology.**
2. **Explore potential connections between learning scenarios and your existing teaching practices or curriculum frameworks.**
3. **Assess the feasibility of integrating learning scenarios within your specific educational context (Challenges & Opportunities)**
4. **Identify a scenario (and possible STEAM disciplinary learning) that may be feasible in your school context.**


Questions