

# Science for Fun: Parent Preservice Partnerships that Build Science Capital in Primary STEM

Dr Eleanor Walsh , Manager of the CRAFT Maker Space, Mary Immaculate College | Dr Maeve Liston , Director of Enterprise & Community Engagement, Associate Professor Science Education, Mary Immaculate College

A collaborative study on fostering **Science Capital** through school –university – family partnerships, with targeted engagement with underrepresented communities including the **Irish Travelling community** and families in **DEIS Urban Band 1 schools** .



# Transforming Curiosity into Empowerment

**20,000+**

Participants Engaged in 2025

**500+**

Children in School-Based Workshops

**300+**

Pre-service & In-service Teachers Supported





# 2025: Science For Fun Project

23

Preservice Teachers

Participating in the co-facilitation partnership model

120

Children Reached

Through Science for Fun in 2025 alone

62

Adults Engaged

Parents and family members participating as active partners

3

University Staff

Dr Sandra Ryan, Lecturer in Education (Sociology & Educational Disadvantage)

Dr Maeve Liston, Director of Enterprise & Community Engagement, Associate Professor in Science Education

Dr Eleanor Walsh, STEM Outreach Manager, CRAFT Maker Space

The **CRAFT Maker Space** at Mary Immaculate College is built on a mission of capacity -building for teachers and providing inclusive, inquiry -driven STEM learning.

The **Science for Fun (SFF)** project sits at the heart of CRAFT's community and family engagement strategy, connecting university expertise with the families who need it most

# Bridging the STEM Divide in Marginalized Communities

## The Context

Focuses on DEIS Urban Band 1 contexts (Delivering Equality of Opportunity in Schools—Ireland's most disadvantaged designations).

Specific imperative to support the Irish Traveller community, an indigenous ethnic minority historically underrepresented in formal education and STEM.

## The Disconnected Circuit



### The Problem

The Problem: STEM is often perceived as inaccessible, disconnected from everyday lived experiences, and lacking intergenerational support mechanisms within marginalized groups.

# Moving Beyond "Science is for Nerds"

## What is Science Capital?

Science Capital encompasses an individual's science -related knowledge, attitudes, experiences, and social contacts. It reflects how much science is part of everyday life — and how personally relevant it feels.

Families with higher science capital naturally embed science into daily conversation and activity. SFF exists to bridge this gap for disadvantaged families, ensuring science feels familiar and achievable for everyone.

## The Three Pillars of Science Capital Teaching

### Personalising

Connecting scientific ideas to students' own lives, interests, and community contexts.

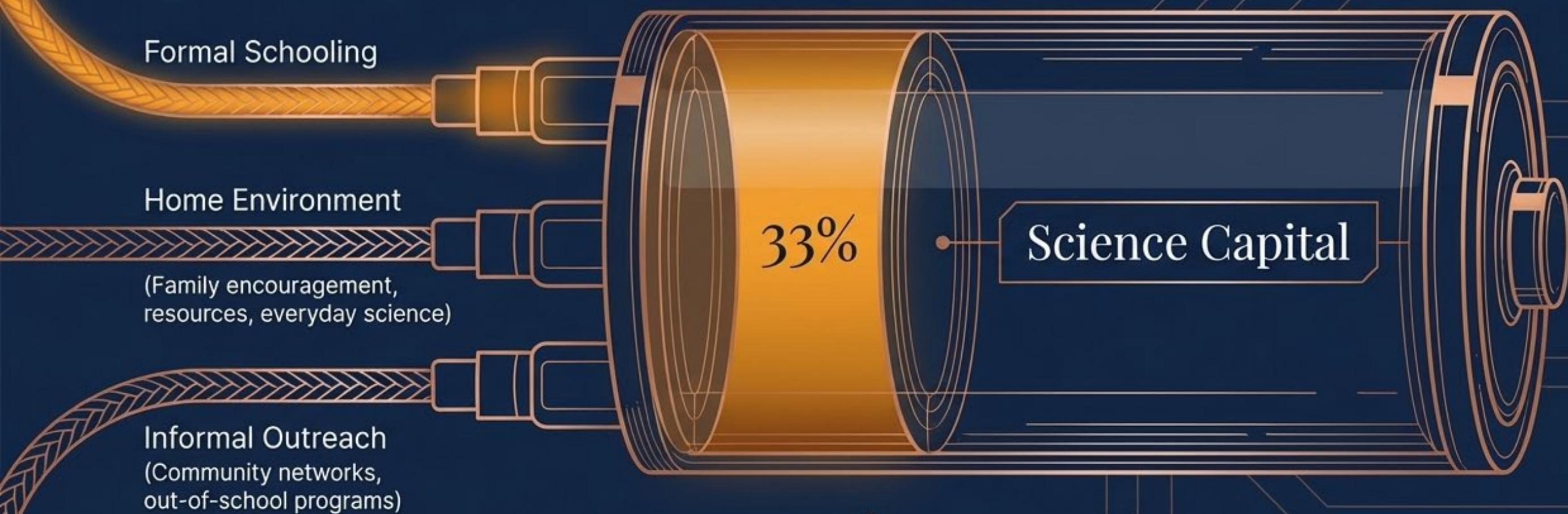
### Eliciting

Drawing out the science knowledge and experiences families already hold, validating what they know.

### Building

Expanding science identities so that all participants see themselves as capable of doing science.

# Charging the Science Capital Battery



Formal schooling **alone cannot reach full capacity**. By bringing parents into the classroom as instructional co-facilitators, we simultaneously charge the Home and School inputs, organically increasing the family's total **Science Capital**.

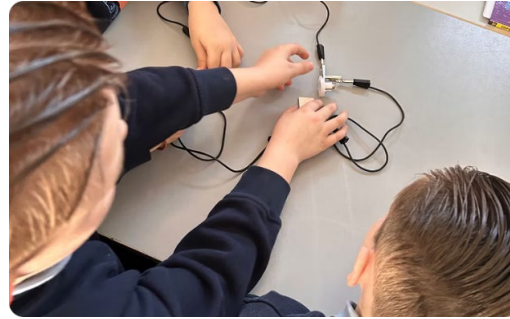
The SFF Model

# Co-Facilitation: A Unique Instructional Partnership



## Preservice Teacher Preparation

Preservice teachers (PSTs) from the "**Working with Families**" elective run dedicated 30 -minute pre -workshop sessions, mentoring parents in both the science content and facilitation approach before a single child enters the room.



## Parents as Instructional Partners

Parents transition from being **visitors** in the school setting to **co-leaders** at science stations — a powerful shift in identity and agency that challenges traditional assumptions about who belongs in STEM spaces.



## Relational Trust at the Core

Building **confidence in adults first** is central to the model. When parents feel capable and welcomed, that security radiates to children — creating a shared learning environment grounded in trust and mutual respect.

# Project Design: The Science for Fun Intervention



## 1. Preparation

30-minute Pre-Service Teacher (PST) & Parent prep sessions to build shared understanding and pedagogical confidence.



## 2. Co-Facilitation

Parent-PST teams lead groups of 4-5 children. Topic: Electricity & Magnetism (highly accessible, curriculum-aligned, hands-on).



## 3. The Spiral Approach

Station-based learning where knowledge compounds progressively from one station to the next using low-cost, replicable materials.



## 4. The Home Extension

STEM kits sent home to sustain the learning loop beyond the classroom walls.

# "Hands-on, Minds-on" Electricity and Magnetism

## Workshop Design

The station-based workshop model is carefully aligned with the **primary science curriculum**, ensuring direct relevance for both teachers and families. Children and families explore concepts including **circuits, motors, and magnetic force** using low-cost, everyday materials — making the point that science is accessible to all.



### Simple Circuits

Battery, wire, and bulb fundamentals



### Motors in Action

Converting electricity to movement

## A Spiral Learning Approach

A **spiral approach** structures the stations so that each one builds upon the last. Participants deepen their understanding progressively as they move through the space, reinforcing prior learning and introducing new complexity — supporting both novice and more experienced learners in the same room.



### Magnetic Force

Attraction, repulsion, and field mapping

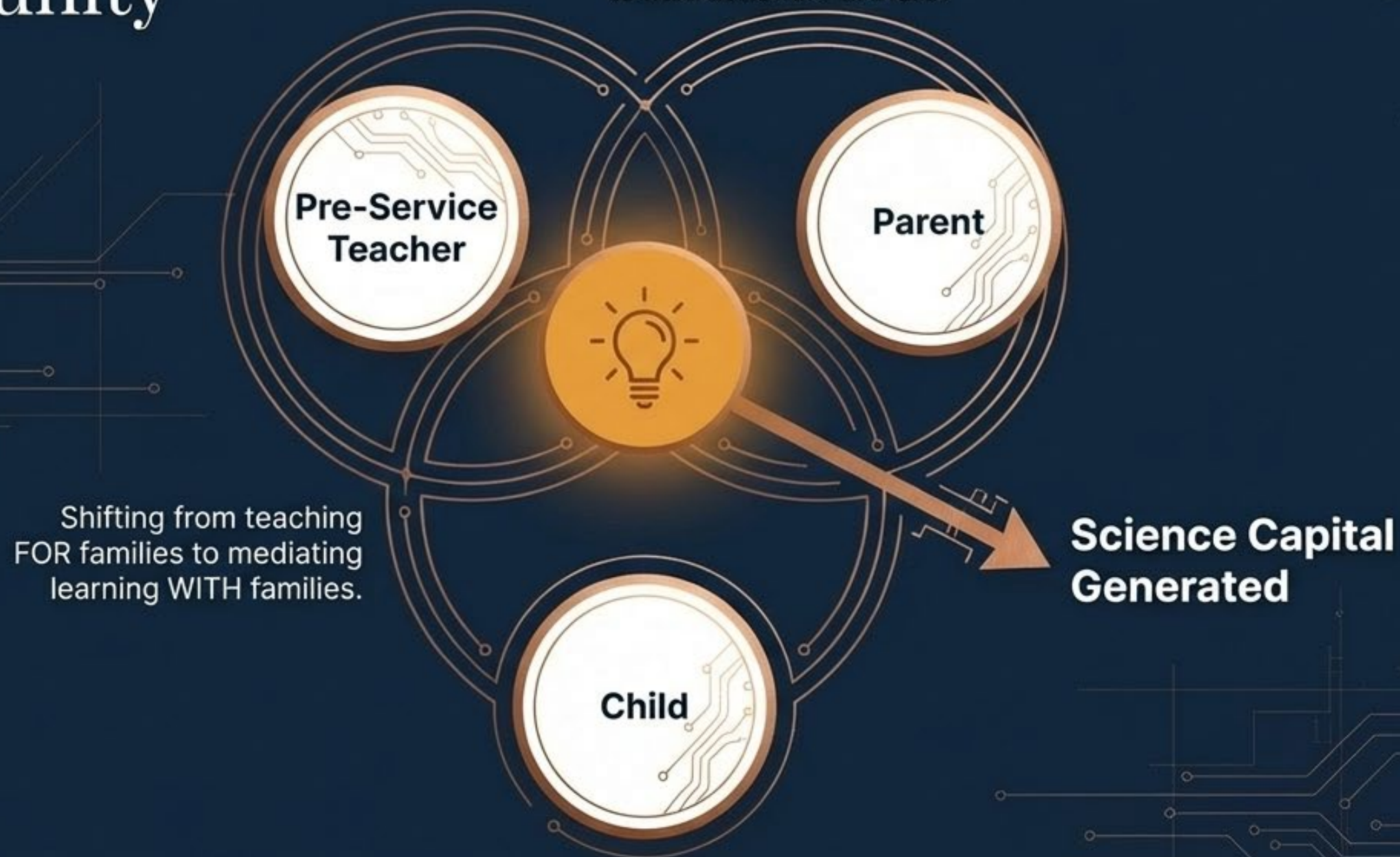


### Scribble Bots

Creative making meets engineering

# Bridging University and Community

Moving from Passive Visitors to Instructional Partners.



## Preservice Teacher Outcomes

# From Apprehension to "The Parents Were Brilliant!"

Preservice teachers entering the programme frequently reported feeling **nervous** or "**daunted**" at the prospect of communicating directly with parents — a community they were not yet accustomed to engaging with professionally. Many were uncertain how parents would respond to being guided through science content by a student teacher.

Post-workshop reflections told a strikingly different story. PSTs overwhelmingly recognised parents as **knowledgeable assets** and genuine instructional partners and described the experience as transformative for their professional development.

"The parents were brilliant — they really got stuck in and I could see how much they cared."

"I was nervous at first but by the end I felt like we were a team."

"This changed how I think about involving families in learning."

### Communication Skills

Confidence in explaining science clearly to adult learners

### Inclusive Pedagogy

Appreciating diverse community knowledge and experience

### Partnership Mindset

Viewing families as collaborators, not just observers

## Parent Outcomes

# Empowering Families Through Discovery



### Growing Confidence

Parents arrived uncertain and left transformed. *"I am learning a lot. I didn't know all this science"* — a sentiment echoed widely, reflecting how participation shifted self-perception from bystander to capable science person.



### Precious One-on-One Time

*"It was great to sit with my child and focus on just them — we don't even have time at home."* The workshop created rare, protected space for deep, unhurried engagement between parent and child.

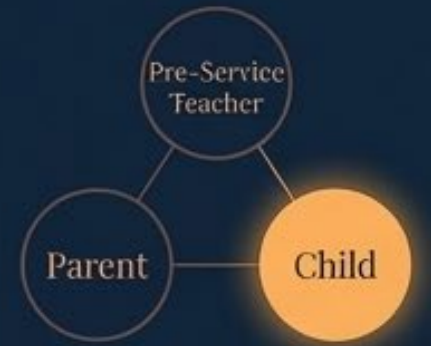


### Science as Shared Joy

The shift from science as **"scary"** to science as **fun and shared discovery** was a consistent finding — reframing STEM as something families can own and enjoy together, not just something that happens in school.



# Children: Sparking Persistence and Joy



## Increased Engagement

Heightened enthusiasm driven by the presence and interest of their parents in the classroom.



## Persistence in Problem-Solving

The desire to impress the parents pushing children to iterate and overcome challenges.



## Demystifying the Scientist

Seeing science as highly relevant and accessible because their own family actively values and participates in it.

Scaling & Community Impact

## 20 25 Reach: Growing the Maker Culture

### A Replicable National Model

The success of Science for Fun has directly informed the design of other CRAFT programmes, including **Minecraft Education** and **Sustainable Energy** whole -school days. The partnership approach — university, school, and family working together — is proving both scalable and transferable to new contexts.

### International Significance

By documenting outcomes rigorously and presenting findings at forums such as the NPSE Conference, CRAFT is contributing to a growing evidence base for **inclusive STEM practice** that has relevance far beyond Ireland — offering a model other institutions can learn from and adapt.

# Scaling the Impact: The CRAFT Ecosystem



Science for Fun is not an isolated experiment—it is the pedagogical engine driving a robust, well-oiled machine capable of massive regional scale.

# Rewiring Initial Teacher Education

## The Future of Equitable STEM Education



### Authentic Partnerships

Embed structured, school-family co-facilitation directly into the core practicum of teacher preparation, moving beyond theoretical lectures.



### Relational Competence

Shift the focus of teacher training from merely delivering content to mastering the relational skills required to navigate diverse family contexts.



### Science Capital Frameworks

Adopt Archer's frameworks to ensure interventions explicitly make STEM relevant, familiar, and accessible to DEIS and marginalized communities.

# Inspiring the Next Generation of Makers

## Relational Trust is the Foundation

Sustainable, high -impact STEM engagement is built on genuine relationships between the university and the communities it serves. Trust cannot be assumed — it must be earned through consistent, respectful, and co -designed partnership over time.

## Expanding the Partnership Model

Looking to 2026, future goals include extending the SFF model to more **DEIS schools**, developing feeder primary programmes, and deepening engagement with the Irish Travelling community and other underserved groups.

## Science Capital That Lasts a Lifetime

When we invest in empowering parents — not just children — we create science capital that ripples across generations. Families who experience science as joyful, accessible, and *theirs* pass that identity on. **That is the lasting legacy of Science for Fun.**