NCI Tionscnamh Luathfhoghlama Early Learning Initiative

BEST RESEARCH PROJECT

STEM Family Learning in the Community

National College of Ireland (NCI) is a not-for-profit, HEA-funded, independent higher education institution in Dublin's Inner city. NCI delivers undergraduate and postgraduate programmes in computing, business, psychology and education with a long-standing mission to widen participation and education pathways, engage deeply with its local community and change lives through education. The Early Learning Initiative (ELI), based at NCI, is a nationally recognised centre of excellence in early intervention and community education. In 2024/25, ELI engaged 23,659 people across Ireland through early childhood home visiting, literacies and STEM, educational guidance and capacity-building programmes.

STEM Family Learning in the Community is delivered by an interdisciplinary partnership between ELI, NCI's School of Computing and department of Psychology. The team combines academic rigour with grassroots expertise and includes seven PhD-qualified staff (five in Social Sciences) alongside experienced practitioners, coordinators and community-based home visitors. This blend ensures programmes are research-informed, culturally responsive and trusted by families least likely to access STEM through formal channels.

NCI Mayor Square Campus

NCI Spencer Dock Campus

OUTREACH – SCALE, NATURE, GOALS AND SUCCESSES

Goal: to create multiple, age-appropriate entry points into STEM for disadvantaged children (3–16+) and their parents in Dublin's Inner City (DIC), building science capital, interest in the scientific method and a sense of belonging in research, innovation and science.

Programme suite and typical delivery settings:

- STEM Play & Learn (ages 3-5) a 4-6 week summer home-visiting STEM programme supporting playful STEM at home. Models playful, low-cost activities that parents can repeat at home; delivered by trained home visitors.
- Junior Coding Club (ages 7–12): 8 weeks, 1 hour per week; block-based coding and educational robotics; integrates maths/science concepts; includes take-home prompts to spark family talk.
- Senior Coding Club (ages 13–16): 8-day progression to text-based programming with projects and a public showcase/ hackathon.
- Family STEM Events (0+): inclusive campus/community events during Science Week, Engineering Week and Earth Day; co-hosted with schools/services; accessible, replicable activities.
- Reach and successes 2024/25 academic year (selected):
- Literacies & STEM programmes engaged 3,684 children and 3,719 parents in DIC.
- Family STEM Events: 7 events with strong satisfaction (details in Results).
- Coding Clubs: Junior (122 children, 21 parents); Senior (34 children, 21 parents).
- STEM Play & Learn: 33 families, 133 home visits over summer.

The programme's trusted partnerships with DEIS schools, after-schools and community organisations, plus delivery on the NCI campus, enable sustained engagement among disadvantaged, migrant and transient families.

METHOD – HOW THE PROGRAMME FUNCTIONS AND WHY IT WORKS

Whole-family, research-driven model: We embed STEM in everyday contexts (home, play, school and community) so parents can act as their child's first and best educator. Programmes are co-designed and iteratively improved through Community Action Research (CAR), with feedback and evaluation informing annual updates to curricula, logistics and inclusion strategies.

Key design features:

- Scaffolded progression from early years to adolescence to revisit core ideas at increasing complexity.
- Parent-centred engagement (STEM 101, take-home prompts and Technology Clinics) responding to evidence that parents value STEM but lack confidence.
- Inclusive and bilingual delivery by local staff; targeted outreach to DEIS schools, homeless/IPAS accommodation and migrant families.
- Cross-sector collaboration with schools, youth/afterschool services, corporate volunteers and NCI students to extend capacity and mentorship.
- Mixed-mode delivery (home visits, in-person, on-campus, online) to reduce access barriers.

INNOVATION – TOOLS, TECHNIQUES AND WHAT'S DISTINCTIVE

- Research-to-practice loop: real-time insights from CAR and parental-attitudes research directly inform content (e.g., Technology Clinics topics, STEM 101, inquiry-based elements).
- Deliberate focus on parental science capital: few STEM outreach programmes explicitly centre parents as change agents; ours does.
- Equity-led design: intentional inclusion of girls, disabled and neurodiverse learners, homeless/IPAS and low-income families; gender-in-STEM evaluations under way.
- Hybrid, flexible formats: home-visiting STEM, online supports and on-campus events meet families where they are.
- Open and accessible dissemination: community briefings, infographics and lay summaries complement academic outputs.

DEVELOPMENT: PLANS TO GROW SCALE, RANGE AND BUDGET

Based on 2024/25 findings we will: (i) scale Coding Clubs and embed the Think Like a Scientist pilot; (ii) expand parent engagement via Technology Clinics and STEM 101; (iii) update the STEM Family Learning Framework; (iv) scope a longitudinal study on sustained participation, aspirations and progression to third-level; and (v) grow regional reach through replication with partners. Sustainability is supported by Research Ireland funding, NCI in-kind support and philanthropic/corporate partnerships.

RESULTS: PARTICIPATION, EVALUATION AND VOICES FROM FAMILIES

- **Improved STEM confidence and engagement** among children and parents
- **Increased parental understanding** of STEM and ability to support learning at home
- **Higher participation by girls and marginalised groups**
- **Improved coding skills and critical thinking** among participants
- **Stronger sense of belonging in STEM** ("STEM is for me")
- **Peer-reviewed research outputs**, national conference presentations, and public-facing resources

FAMILY STEM EVENTS (7 EVENTS, DUBLIN'S INNER CITY)

- **Participation:** STEM Carnival (87 children), Science Week (10 Stretch Graduate families), Engineering Week (20 children), Earth Day (13 families), Doodle Den graduations (52 families), STEM & Coffee (10 families).
- **Satisfaction and outcomes:** 100% of 58 parents found events enjoyable for children and 93% enjoyable for themselves; 97% of 148 children found events fun and 87% wanted more science/engineering activities.
- **Parent voice:** "Everything went better than expected, [child] loved it, and I also loved it. THANK YOU for inviting us."

JUNIOR CODING CLUB (8 WEEKS)

- **Participation:** 122 children and 21 parents; 7 volunteers; 67 children and 19 parents attended the final showcase events.
- **Satisfaction and outcomes:** 80% enjoyed the club; 74% want to attend third-level; self-rated computer-skills confidence up 63% and coding skills up 54%. 81% learned to light up their robot; 72% built their robot.
- **Parent voice:** 100% said STEM skills are crucial for their child's future; 94% reported improved STEM skills/confidence.
- **Child/parent voices:** "My favourite part of coding club was… how to code." (Child). "Well so far I can see my son… improving in his education." (Parent).

SENIOR CODING CLUB (8-DAY PROGRESSION)

- **Participation:** 34 children and 21 parents; 7 volunteers; 67 children and 19 parents attended the end-of-camp hackathon.
- **Satisfaction and outcomes:** intention to attend third-level rose from 71% (pre) to 76% (post); confidence in computing/coding up 54%; interest in science/technology up 19%. 93% Parents reported that technology was interesting to their child and 87% that coding was interesting.
- **Child voice:** "I didn't think I could do coding, but now I want to do more."

STEM PLAY & LEARN SUMMER HOME-VISITING (4-6 WEEKS)

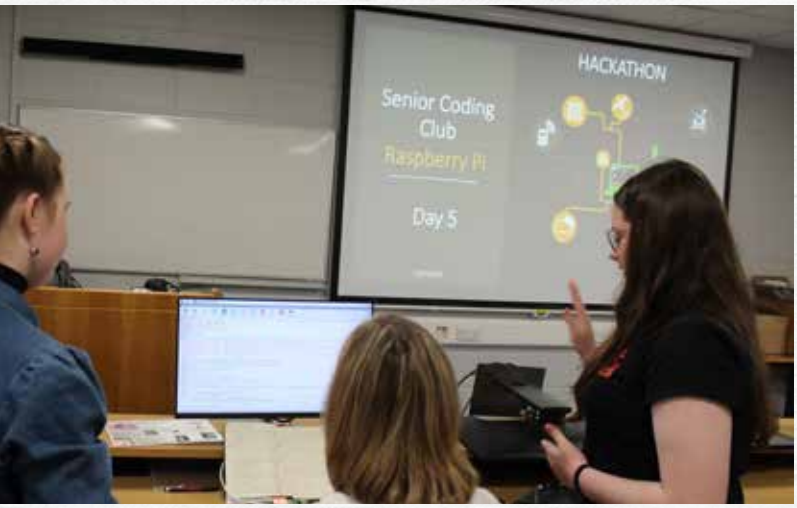
- **Participation:** 33 families; 133 in-person visits.
- **Satisfaction and outcomes:** (n=28 parent evaluations): 89% enjoyed the programme; 79% observed gains in children's language; 75% observed gains in fine-motor skills and concentration; parental confidence supporting STEM at home rose to 78% (+15% from the previous year).
- **Parent voices:** "Home Visitor had so much patience and lots of creativity… my child was very engaged and learned more than I imagined." "It was so nice to talk to the visitor… she helped me through a difficult time."

WHOLE-PROGRAMME CONTRIBUTION

Across Literacies & STEM, 3,684 children and 3,719 parents were engaged in Dublin's Inner City. ELI's total engagement reached 23,659 people nationally. Evaluations consistently show the greatest impact where parents and children learn together, validating the programme's family-centred approach.

WHY THIS OUTREACH DESERVES RECOGNITION

NCI's STEM Family Learning in the Community tackles entrenched educational inequality with a coherent, evidence-based pathway from the early years to adolescence, co-designed with and for families who are typically excluded from STEM. The model demonstrably improves children's skills and aspirations, grows parental confidence, and builds a local culture of 'STEM is for me'. Its distinctive research-to-practice engine, interdisciplinary team and trusted community delivery produce measurable results at scale while advancing national policy goals on access, inclusion and skills. This is higher education delivering real social impact.



Photographs of STEM programmes in action in the North East Inner-City Community

STEM EVENT – Parent quote: "I can't believe how engaged my child has been, he has literally spent 40 minutes sitting and concentrating (which he does struggle with usually) with that shaving foam and food colouring activity. This is something I can do at home easily with him."

STEM & COFFEE – Parent quote: "I didn't realise lego, blocks and pegs were all STEM. We do these at home"

STEM Play & Learn – Home Visitor quote: I brought the Scavenger Hunt today. We looked for all the images on the list first, child was very excited running around and searching in the park, it was great to see he had a good time outside. Mam helped too, and they both enjoyed the activity, it was a great bonding experience for them."

Senior Coding Club – Article quote: "Beyond supporting their children, parents can also benefit from these events. They connect with other parents, organizers, and mentors, building a supportive community around STEM and coding."

Coding Club at Belvedere Youth Club

Families attend STEM and coffee morning at NCI

STEM Play and Learn Indoor Activity

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