The Early Childhood STEAM Network

An established community of practice

In 2021 the use of a STEM network was proposed to support early childhood (EC) professionals' understanding and knowledge of EC STEM. Since then, a vibrant community of EC educators, managers, and academics has blossomed. This article details the network's aims, successes, and plans, showing the valuable role that communities of practice can play in embedding and supporting STEM in EC.

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Science, Technology, Engineering, and Mathematics (STEM) education is increasingly a focus of educational policy. In early childhood education settings, almost a third of educators show a less than satisfactory awareness of STEM learning (DES, 2020). This is concerning, given that children's engagement in STEM is part of the Department of Education's inspection criteria for early childhood settings (DoE, 2022).

Communities of practice (COPs) have been found to mediate learning in STEM (Boonstra et al., 2022), and government policy identifies COPs as an effective means of supporting early childhood educators' STEM learning. The Early Childhood STEAM Network was founded in 2021 to support early childhood professionals' understanding and knowledge of STEM. Since then, a vibrant community has flourished. This article shows the valuable role that COPs can play in embedding and supporting STEM in early childhood.

Early Childhood STEAM Network

The aim of the Early Childhood (EC) STEAM Network is to bring together early childhood education (ECE) professionals from pre-primary settings (from birth to six years) with an interest in STEM education and the Arts.

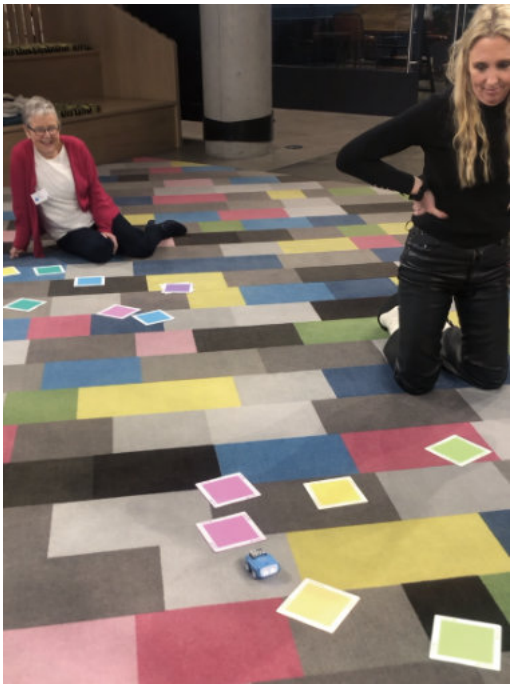
The network meets regularly to support, connect, and inform the ECE community, identifying opportunities to share knowledge, build on research, and disseminate learning (O'Neill et al., 2022; O'Reilly, 2022). Professional collaboration is a crucial part of educator professional development (Boonstra et al., 2022), and COPs provide supportive, dynamic spaces where individual and group social learning is explored, challenged, shared, and grown (McDonald & Cater-Steel, 2017).

Members of the network share a common goal but have disparate interests and expertise (practitioners, researchers, academics, students). While the focus is always on STEM, the variety of discipline interests has allowed for an array of topics to be examined during online and in-person meet-ups. Network meetings provide a safe space to question, discuss, and learn through a 'situated process of participation and socialisation' (Lave & Wenger, 1991) focusing on early education pedagogy and traditions. Everyone has something to offer, and everyone has something to learn.

Network event focusing on supporting Mathematics in preschool using picture books

The network challenges its members to be progressive in adopting new practices. STEM's constituent parts are not traditionally included in ECE practice, so the introduction of some aspects of STEM – such as engineering principles or modern technologies for learning – can be challenging. Play, holistic learning, and child-led approaches are fundamental to ECE and must be reimagined, as lines between digital and traditional play become ever more blurred (Marsh et al., 2019; Pettersen et al., 2022).

Opportunities to use traditional play materials alongside digital devices often form part of network meet-ups. These hands-on STEM experiences positively impact on practice by widening children's experiences of STEM in preschool (Venkat & O'Reilly, 2022) or by giving pre-service educators opportunities to engage with STEM concepts and materials (O'Neill, 2021).



Visit to Microsoft Ireland to learn about computational thinking for young children using robots

Research and collaboration

There is a dearth of information about ECE educators' perceptions of, and attitudes towards, STEM learning in Ireland. In response, the network gathered and analysed the opinions of 300 educators on this topic in 2021. Findings suggest that pre-service education often omits STEM content and that ECE educators are eager to learn more about STEM (O'Neill et al., 2023).

The Early Childhood STEAM Network has begun collaborating with established and well-respected STEM organisations, such as the Science Foundation Ireland (SFI)-funded programme Maths4all (maths4all.ie).

In spring 2023, the network facilitated maths workshops with Maths4all in urban and rural locations in Leinster.

The network has also begun collaborating with established and well-respected STEM organisations, such as the SFI-funded programme Maths4all (https://maths4all.ie/). In spring 2023, the network facilitated six early maths workshops with Maths4all in urban and rural locations in Leinster. Feedback was overwhelmingly positive, and further workshops are planned for autumn 2023. Crucially, network members were supported to facilitate these workshops, building STEM knowledge, capacity, and expertise within the ECE community.

Through the network, we have identified a need for STEM support and information-sharing at all levels of practice (O'Neill et al., 2023). Those in teaching, support, and policy roles can benefit from network collaboration as much as pre-service educators and those currently working in ECE. The network provides ongoing opportunities for learning and access to digital devices and STEM materials, and connects those interested in innovative STEM practice and research. In addition, mentoring for recent graduates (or those

new to STEM) and networking opportunities for established educators will embed STEM further in Irish ECE.

Impact on policy and practice

The STEM Education Implementation Plan to 2026 (Government of Ireland, 2023) identifies COPs as a support for expanding STEM knowledge in pre-primary and beyond. The EC STEAM Network exemplifies how COPs promote the sector's understanding of and engagement with STEM. For COPs to flourish and succeed, however, supports are required. Kezar and Gehrke (2017) stress that supports for COPs should include a viable funding model; professionalised and committed staff; leadership development, distribution, and succession planning; and an articulated community strategy. At present, network members give their time and energy freely, and resources (including STEM materials, teaching resources, room rental, and utilities) are gratefully donated. But this is not a sustainable model.

How to develop, cultivate, and sustain a COP for supporting learning and innovation needs to be addressed. If this method is to be adopted as part of the STEM Implementation Plan, thought will need to be given to how these groups can be established and sustained. Should the COP model be replicated throughout the country – and we strongly recommend that it is – then leadership in EC STEAM education is essential. Leaders are needed who have the necessary EC STEM expertise and who are community focused and committed to developing the skills and knowledge of people in the sector. Government investment in people (skills and expertise development), and dedicated funding for inevitable running costs (administrative, resource provision, venue) are imperative.

The EC STEAM Network exemplifies how COPs (Communities of Practice) promote the sector's understanding of and engagement with STEM.

Looking forward

A strength of the network is our combined practice and research expertise. A long-term goal is to carry out collaborative classroom-based research illustrating EC STEM practice in Ireland. The relationships between members provide support for educators and ensure that research is meaningful and useful to the sector. Collaboration with similar organisations in other countries will add to our contribution to the field internationally.

The EC STEAM Network exemplifies how COPs can benefit the ECE sector. Its success can be defined by its growing membership and strong attendance at meetings. It has shown how a group of committed individuals can build capacity, competence, and confidence in EC STEM education, growing expertise from the bottom up. The community is creating a vision for what EC STEM should and could look like in Ireland, and we are excited for its future.

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