Rialtas na hÉireann
Government of Ireland

STEM Education

Implementation Plan to 2026

Foreword

By their very nature, children and young people are innovators. In their boundless curiosity in the world around them and desire to create, they are naturally predisposed to the type of invention and inquiry that are central to the world of STEM and art. We must ensure that our education system, from early childhood to post-primary school, fully nurtures this and supports children and young people in participating fully in these spheres as they grow and learn.

A child's natural sense of wonder and awe about the world begins in early childhood. STEM and the Arts concepts are first introduced through play and hands-on experience in the home learning environment and in early learning and care settings. In nurturing children's sense of curiosity and perseverance, these experiences lay the foundation for future learning. These early experiences are nurtured and expanded on as the child moves along their educational pathway to primary school and on to post-primary.

Our educators have a vital role in nurturing that sense of curiosity, critical thinking, innovation, creativity, collaboration and problem-solving and in ensuring that all children regardless of gender, background or ability have equality of opportunity We must ensure that they have the guidance, support and resources necessary to educate, engage and inspire their learners in STEM and the Arts.

For these reasons we are delighted to introduce the publication of this STEM Education Implementation Plan to 2026. The result of considerable research, consultation and collaboration between all stakeholders, the STEM Education Implementation Plan to 2026 looks to continue improving the STEM learning experiences of all children and young people and it sets out the actions necessary to continue on our ambitious journey to 2026 and beyond.

Through this plan, we will continue to support exciting programmes to promote STEM and the Arts, including the STEM Passport for Inclusion Programme, the Science Foundation Ireland Discover Programme, a central repository of STEM resources and exemplars of and new partnerships between business/industry and schools. We will develop new professional learning and collaboration opportunities for early learning and care settings and schools to ensure that they feel fully equipped to lead on STEM education.

While our respective Departments will lead on this, the success of the STEM Education Policy Statement and this implementation plan relies on the collaboration, support and commitment of all stakeholders.

We know that if all stakeholders embrace this plan it opens up a world of possibilities for our children and young people, who will become the creative STEM innovators of tomorrow.

Norma Foley, TD

Roderic O'Gorman, TD

Introduction

The STEM Education Policy Statement 2017–2026 (Policy Statement) was published by the then Department of Education and Skills in November 2017. It focusses on the many strengths in STEM education, while also providing a roadmap to address the areas for development. It sets out ambitious objectives and actions required to achieve and improve the STEM education experience for all learners from early learning and care to post-primary level.

The Policy Statement vision for STEM education is that

> *Ireland will be internationally recognised as providing the highest quality STEM education experience for learners that nurtures curiosity, inquiry, problem-solving, creativity, ethical behaviour, confidence, and persistence, along with the excitement of collaborative innovation.*

Central to achieving this vision is the ambition to deliver systematic improvement in STEM education across the continuum of education from early learning and care to post-primary level. In order to achieve this the areas for policy development and action, as identified in the Policy Statement, span 4 pillars:

Pillar 1. Nurture learner engagement and participation

Pillar 2. Enhance early years educator and teacher skills

Pillar 3. Support STEM education practice

Pillar 4. Use evidence to support STEM education

Key Achievements

The STEM Education Implementation Plan 2017-2019 was published alongside the Policy Statement. It built on a range of reforms and initiatives that were already underway in STEM, in areas such as curriculum and assessment reform, teacher professional development, embedding digital learning and advances in initial teacher education. It focussed on establishing what is necessary to provide a quality STEM education experience for all learners with many achievements to date including;

- STEM related curricular reform implemented since 2018 include Junior Cycle Mathematics, Leaving Certificate Applied Mathematics, Leaving Certificate Art, Leaving Certificate Agricultural Science and Leaving Certificate Computer Science with more under review and redevelopment such as Primary Mathematics
- Ongoing provision of STEM professional development by the Department of Education support services
- Development and publication of guidelines and accompanying toolkit for STEM partnerships between schools and business/industry
- Ongoing support for informal STEM education such as BT Young Scientist and Technology Exhibition, ESB Science Blast, SciFest and I Wish
- Partnership established between the Department of Education and Science Foundation Ireland to support STEM projects under the SFI Discover Programme
- Publication of literature review and recommendations for Gender Balance in STEM Education
- Continued consideration of gender balance, equity, diversity and inclusion in the development and/or review of national curriculum specifications and all Department of Education policies, strategies and resources
- Development of the SFI Curious Minds programme, to include consideration of gender equality and inclusion in the language, visuals and examples used throughout the programme and in professional development offered to teachers
- Publication of literature review and recommendations in relation to STEM and the Arts in education.

A full report, 'STEM Education Implementation Plan – Phase 1 Enhancing Progress Report', detailing all achievements, was published in early 2023 and is available on the Government of Ireland website.[1]

Implementation

Implementation of both the Policy Statement and Implementation Plan is overseen by the STEM Education Implementation Advisory Group (IAG). This group includes representatives from early learning and care, primary and post-primary schools, further and higher education, business/industry, the arts, the fields of STEM, the Department of Children Equality, Disability, Integration and Youth, along with representatives across relevant areas of the Department of Education.

In order to provide a particular focus to a number of key areas identified for progression, three subgroups were established under the guidance of the IAG. These groups are as follows:

- The STEM and the Arts Advisory group, established to advise on the development, delivery and oversight of relevant actions that enhance the link between STEM education and the Arts;
- The STEM Gender Balance Advisory Group, established to advise on the oversight, development and delivery of relevant gender balance actions;
- The STEM Education Business and Industry subgroup, established to advance the actions in relation to collaboration with business/industry.

When the Policy Statement was published in 2017, it had been intended that Implementation would be realised across three phases with an implementation plan published for each of the following phases:

Phase 1: 2017-2019, Enhancing
Phase 2: 2020-2022, Embedding
Phase 3: 2023-2026, Realising

However, Phase 2 implementation was postponed due to the impact of COVID-19 on the education system when closures of early learning and care settings and schools were mandated as part of public health efforts to contain the spread of the virus in early 2020 and again in early 2021. These closures and the time required to settle learners back into education settings, as well as addressing the needs arising from varied remote learning experiences, impacted on the embedding of STEM education. As a result, Phase 1 implementation was extended to 2022, when it was possible to consult with the system on a combined Phase 2 and 3 implementation to 2026.

Consultation Process

In 2022 a comprehensive consultation process was put in place, including;

1. Public call for written submissions
2. Public call to contribute via an online questionnaire

[1] gov.ie - STEM Education Policy (www.gov.ie)

3. Focus groups on specific themes with key stakeholders (e.g. education partners, business/industry, teachers, early years educators, learners, parents)
4. Bilateral meetings with other departments, agencies and stakeholders

The consultation process has shown that there is a need for a continued focus on the implementation of STEM education across the education system with the programme of work to 2026 to include;

- Provision of examples of what STEM education can look like from early learning and care to post-primary level
- Supports on what integrated STEM looks like at primary and post-primary school level
- A range of quality professional learning experiences for early years educators and teachers across primary and post-primary schools to support staff with STEM content knowledge, in planning and implementing integrated STEM activities across all three levels
- Ensuring that student teachers in initial teacher education have opportunities to engage in and teach STEM lessons
- Enhancing the partnership between schools and business/industry and the research community
- Provision of information on STEM careers and courses and equitable access to STEM/STEM and the Arts role models
- Provision of a central repository of resources and exemplars of STEM/STEM and the Arts learning opportunities
- Continued review of STEM curriculum and assessment across all levels
- Provision of funding to support projects that engage children and young people in STEM in primary and/or post primary schools.

The Department of Education and the Department of Children, Equality, Disability, Integration and Youth will lead on this programme of work but there is a need for all stakeholders in the STEM eco-system to work together to realise the ambitious actions.

Programme of work to 2026

Implementation of the programme of work to 2026 spans the four pillars of policy development and actions identified in the Implementation Plan take into account the findings of the consultation process.

Pillar 1

Nurture learner engagement and participation

Pillar 2

Enhance early years educator and teacher skills

Pillar 3

Support STEM education practice

Pillar 4

Use evidence to support STEM education

Pillar 1

NURTURE LEARNER ENGAGEMENT AND PARTICIPATION

Pillar 1

Nurturing young people's STEM curiosity starts from early childhood and continues throughout their learning journey. Our education system has a responsibility to ensure that all learners are provided with a high-quality STEM education experience that creates a positive disposition towards STEM/STEM and the Arts and enables them to participate, influence and succeed in a changing world.

We must ensure that learners have a positive engagement with STEM education, while also increasing the uptake of STEM related subjects for learners of all backgrounds, ability and gender. High-quality advice on the importance and relevance of STEM skills, as well as information on the range and diversity of STEM related career opportunities is required for schools, learners and parents.

The following actions are designed to nurture learner engagement and participation in STEM education.

Pillar 1: Nurture learner engagement and participation

Action Number	Pillar 1 Actions	Delivered by	Timeline
1.1	Develop a quarterly communication with early learning and care settings, primary and post-primary schools, key stakeholders and the STEM community. This communication will include exemplars of STEM/STEM and the Arts in action, information on STEM events and role models, and will highlight opportunities for linkages between early learning and care settings and school communities with STEM business/industry.	DoE/DCEIDY[2]	Ongoing
1.2	Review the provision of STEM careers engagement campaigns to date. This is to inform the development of new measures and/or the continuation of existing initiatives, in order to raise awareness with learners, parents/guardians, teachers, guidance counsellors and school leaders of the diversity of STEM professionals, pathways and careers in STEM and to challenge stereotypes.	SFI /DoE/Business and Industry	Ongoing
1.3	Increase equitable access nationwide to meaningful STEM/STEM and the Arts role models and career awareness activities that challenge stereotypes. An evaluation of the provision already in place should be undertaken in order to make informed decisions on how to progress in this area.	Business and Industry/DoE	Short/ medium-term
1.4	Put in place coherent careers and skills information resources in relation to all learning options for those entering tertiary education, and entering and transitioning within the workforce.	DFHERIS	Medium-term
1.5	Develop subject and career information sheets, starting with STEM subject choices, for primary school children and their parents/guardians that can be provided in advance of the critical transition to post-primary school.	DoE	Short-term
1.6	Ensure assessment practices are aligned to broader STEM goals (as outlined in the Policy Statement) and student-centred inquiry-based learning is integral to the development of STEM education/curricula.	DoE	Medium/ long-term

[2] Appendix A contains an explanation of all acronyms used.

Action Number	Pillar 1 Actions	Delivered by	Timeline
1.7	Undertake a study in relation to timetabling and availability of subjects at post-primary level to understand where, how and why barriers prevent access to students to specific subjects. The results of this study will inform the development of guidelines for schools in relation to successful strategies to improve uptake and access to a wider range of STEM subjects.	DoE/NCCA	Medium-term
1.8	Enhance the linkages between early learning and care settings/schools and the Science Foundation Ireland Discover Centres Network nationwide, in order to provide access to integrated STEM programmes.	DoE/SFI/ESCI/ DCEDIY	Short-term
1.9	Refresh and supplement already collected data to inform an audit of STEM infrastructure in primary and post-primary schools.	DoE	Short/ medium-term
1.10	Scope out the feasibility, with partners, of developing a Transition Year module/unit at second level on 'Pathways to National Apprenticeships'.	National Apprenticeship Office	Ongoing
1.11	Support the STEM Passport for Inclusion, led by National University of Ireland, Maynooth, which recognises the experiences of girls from DEIS schools as they achieve micro-credentials in STEM, through mentoring and engagement with STEM content knowledge.	DoE/SFI/MU	Ongoing
1.12	Develop resources for early learning and care settings that facilitate relevant and meaningful engagement in STEM weeks, which complement everyday STEM learning experiences through play.	DCEDIY/DoE	Medium-term
1.13	Revision of equality, diversity and inclusion training for early learning and care settings will seek to include emphasis on gender balance, equity, diversity and inclusion in STEM-related activities. The revised training will be delivered to early years educators and to school-age childcare practitioners and managers of these settings.	DCEDIY/DoE	Medium-term
1.14	Develop resources for families with young children on STEM in the home learning environment, drawing on Aistear, and in support of First 5 Strategic Action 7.1 ("Support parents and families to provide a stimulating home learning environment for babies and young children, with a particular focus on promoting play").	DCEDIY/NCCA /DoE	Medium-term

Pillar 2

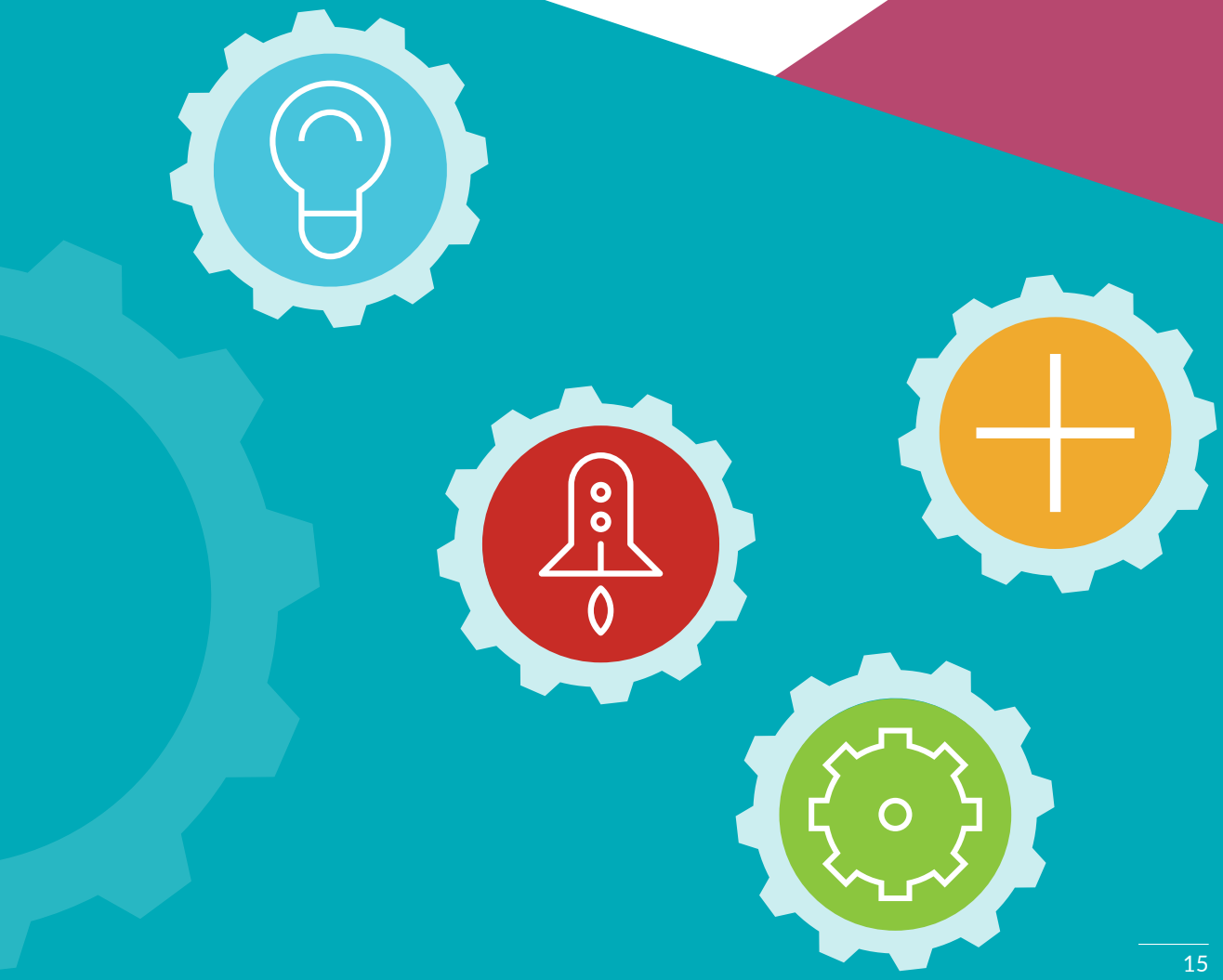
ENHANCE EARLY YEARS EDUCATOR AND TEACHER SKILLS

Pillar 2

Improved early years educator and teacher capacity is a key enabler in delivering STEM education of the highest quality for our learners. STEM education recognises the need for children from early childhood to have multiple and varied opportunities in STEM exploration and discovery. Early years educators and teachers require STEM subject matter knowledge, pedagogical content knowledge, appropriate skills and confidence. Enhanced preparation, development and support, through high-quality initial early years educators and teacher education, induction and ongoing professional learning is required. We must ensure that early year educators, teachers and leaders are provided with the necessary professional supports and opportunities to enable them to achieve this.

Increased learner uptake and development of new STEM related options will require early years educators and teachers to expand on existing STEM learning experiences. We must ensure that we have sufficient skills within the early years educator profession and teaching profession to respond to current and future developments.

The following actions are designed to enhance the STEM knowledge and practice of early year educators and teachers during their initial education and throughout their careers. These supports are intended to enrich current and future classroom practices.



Pillar 2: Enhance early years educator and teacher skills

Action Number	Pillar 2 Actions	Delivered by	Timeline
2.1	Ensure all programmes of teacher education and post-graduate guidance counselling programmes across the continuum include awareness raising training on the barriers to participation of underrepresented groups in STEM and the role of teachers in helping remove these barriers.	DoE	Medium-term
2.2	Develop professional learning opportunities to support teachers and guidance counsellors in raising awareness of STEM subject choices and STEM opportunities, signpost labour market information and promote the diversity in STEM pathways and careers.	DoE/ Professional Development Support Services	Medium/ long-term
2.3	Continued provision of professional development by the Department of Education support services to include continued review of existing STEM professional development to ensure the professional development offered remains of high quality, up-to-date, meaningful, appropriate and easily accessible.	DoE/ Professional Development Support Services	Ongoing
2.4	Periodically review STEM/STEM and the Arts resources to ensure they remain of high quality, up-to-date, and appropriate. Continued delivery of resources to include webinars and exemplars for early years educators and teachers.	Professional Development Support Services /DoE/DCEDIY	Ongoing
2.5	Engage with communities of practice to provide an opportunity for early years educators, teachers, informal practitioners and other stakeholders to collaborate and share STEM/STEM and the Arts ideas.	DoE/DCEDIY	Medium/ long-term
2.6	Support existing pre-service and in-service teacher internships as a facility for student teachers/teachers to experience STEM, as it is applied in the workplace.	DoE	Ongoing
2.7	Develop the SFI Curious Minds programme, to include consideration of gender balance, equity and inclusion in the language, visuals and examples used throughout the programme and in professional development offered to teachers	SFI	Medium-term
2.8	Invite the Teaching Council to be a member of the STEM Education Implementation Advisory Group to ensure alignment of goals, realistic outcome setting and implementation of policy.	DoE/Teaching Council	Short-term

Action Number	Pillar 2 Actions	Delivered by	Timeline
2.9	Explore and develop opportunities for linkages between STEM and the Arts in initial teacher education.	DoE	Medium-term
2.10	Further develop the expertise of professional development support services by upskilling advisors and building expertise, in order to support teachers and early years educators to enhance the linkages between STEM and the Arts.	Professional Development Support Services / DoE/DCEDIY	Ongoing
2.11	Encourage national and local providers to develop specific professional development initiatives linking STEM and the Arts disciplines within national curriculum programmes, such as Teacher Artist Partnership and primary school summer courses.	DoE/ Professional Development Support Services	Medium-term
2.12	The CPD Framework up to 2026 will be used to inform design and delivery of CPD for STEM/STEM and the Arts across the professional development support services primary and post-primary annual work plans.	DoE/ professional development support services	Ongoing
2.13	Provision of a central repository to include resources and exemplars of STEM/STEM and the Arts learning opportunities which will be added to over time.	DoE	Ongoing
2.14	Develop and roll out a CPD programme in STEM/ STEM and the Arts for early years educators, as part of the National Síolta Aistear Initiative (NSAI). This programme will include an introduction to issues regarding gender balance, equity, diversity and inclusion in STEM/STEM and the Arts. Develop resources to supplement the CPD programme, as part of the NSAI, including STEM/STEM and the Arts practice exemplars. Develop and support communities of practice in STEM/STEM and the Arts for early years educators and early learning and care managers to build upon prior learning from the CPD programme.	DCEDIY/DoE	Ongoing

Pillar 3

SUPPORT STEM EDUCATION PRACTICE

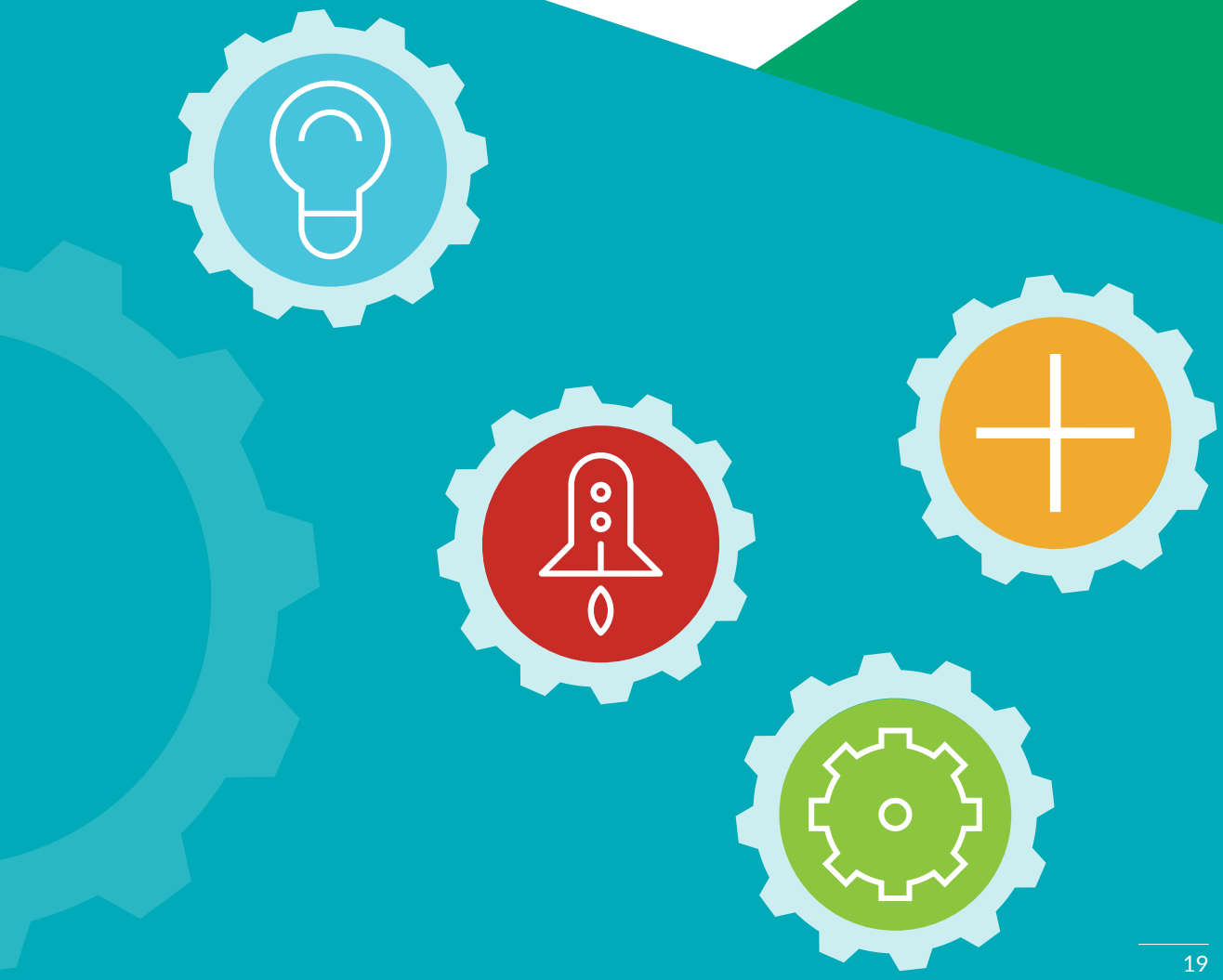
Pillar 3

There is a need to enrich learning, teaching and assessment from early learning and care to post-primary to ensure that learners of all backgrounds, ability and gender are equipped with the skills needed to participate in our changing world. It is essential to place the needs of the learner at the core of learning, teaching and assessment to ensure a positive attitude to STEM education. Early learning and care settings and schools must continually evolve, improve and learn from best practice in relation to STEM education.

We must enable learners to become active and reflective participants by providing a range of learning and formative assessment experiences that enhances their curiosity, inquiry, creativity and problem-solving abilities. In addition, there is also a need to provide out-of-school STEM learning opportunities to further deepen learners' knowledge.

Effective leadership, at both early learning and care and school level, is required to build a STEM culture and enhance the capacity of STEM education. Leaders must develop, support and review STEM learning, teaching and assessment practices and develop strong relationships with early years educators, teachers, learners, parents and the wider STEM community. Partnership with business, industry and the research community will also be important.

The following actions, are designed to enhance STEM education practices in early learning and care settings and schools.



Pillar 3: Support STEM education practice

Action Number	Pillar 3 Actions	Delivered by	Timeline
3.1	Continued review of STEM curriculum and assessment across all levels – early learning and care, primary, junior cycle and senior cycle.	DoE/DCEDIY/ NCCA/SEC	Ongoing
3.2	Continued consideration of gender balance, equity, diversity and inclusion in the development and/or review of national curriculum specifications, as well as all Department of Education policies, strategies and resources.	NCCA/DoE	Ongoing
3.3	Identify opportunities for linkages between STEM and the Arts in curricula, through NCCA's ongoing curriculum and assessment work across early learning and care, primary and post-primary education.	NCCA/DCEDIY /DoE	Ongoing
3.4	Explore the development of a national accreditation framework for whole school culture change at primary and post-primary levels, to address gender balance, equity, diversity and inclusion.	DoE	Long-term
3.5	Support "Creative Youth" school programmes and artist-residency schemes which incorporate STEM, including programmes involving creative practitioners, creative technology, design thinking and other practices across the disciplines of STEM and the Arts.	DTCAGSM/ DoE	Medium-term
3.6	Continue to provide interdisciplinary professional development experiences for teachers through the STE(A)M in Junior Cycle initiative. Continue to provide professional development experiences designed in collaboration with external partners from education, industry and research. Explore the feasibility of expansion of the STE(A)M in Action in School initiative	Professional Development Support Services/DoE	ongoing
3.7	Update and relaunch the STEM School–Business/Industry Partnerships Guidelines and Toolkit which provide the basis for both primary and post-primary schools and business/industry to form quality, inclusive and relevant educational links	DoE/Business and Industry	Short-term

Action Number	Pillar 3 Actions	Delivered by	Timeline
3.8	Continue to benchmark student achievement in STEM through participation in international surveys such as PISA and TIMMS and national surveys such as NAMER. Provision of annual STEM data indicators on participation, attainment and graduate outcomes.	DoE	Ongoing
3.9	Develop a scheme, including the provision of funding, to support projects that engage children and young people in STEM in primary and/ or post-primary schools.	DoE	Short-term
3.10	Foster synergies between the STEM Education Policy Statement and other education strategies including the new Literacy, Numeracy and Digital Literacy Strategy for early learning and care settings, Creative Youth 2023-2027, ESD to 2030: Second National Strategy on Education for Sustainable Development, Digital Strategy for Schools to 2027	DoE/DCEDIY	Ongoing
3.11	*Aistear, the Early Childhood Curriculum Framework*, is currently being updated. The updated *Aistear* will support opportunities for STEM learning through play and play pedagogy.	NCCA	Ongoing

Pillar 4

USE EVIDENCE TO SUPPORT STEM EDUCATION

Pillar 4

Building and sustaining a vibrant STEM education eco-system for all learners will require ongoing innovation in STEM education. Such innovation should be underpinned by evidence generated through STEM research which can identify successful pedagogical strategies, inform school practice and contribute to the ongoing development of curriculum, policy and teacher education.

The continued use of an evidence-led approach to STEM education will assist the Department of Education and Department of Children Equality, Disability, Integration and Youth in implementing and informing future policy decisions. It will also involve monitoring the impact of programmes and initiatives, both formal and non-formal, to improve STEM outcomes across our education system.

The following actions are designed to build a research base, facilitate the use of evidence to support STEM education, and create a culture of innovation in STEM teaching, learning and assessment.

Pillar 4: Use evidence to support STEM education

Action Number	Pillar 3 Actions	Delivered by	Timeline
4.1	Conduct research on what constitutes STEM and the Arts education in early learning and care settings, primary and post-primary schools. The research will identify opportunities and barriers that currently exist and will identify the best means to incorporate STEM and the Arts education into the learning environment.	DoE/DCEDIY	Short/ Medium-term
4.2	Conduct a study to identify programmes that are successful in enabling young people and their families to engage with STEM/STEM and the Arts and which encourage further education involvement/career uptake in these areas. Identify how broader access to these programmes can be supported.	DoE	Medium-term
4.3	Determine ways of embedding evaluation into formal and informal STEM and the Arts programmes to determine the level of achievement and impact of project objectives, and their effectiveness, efficiency, inclusivity and sustainability.	DoE	Medium-term
4.4	Continued partnership between the Department of Education and Science Foundation Ireland on the SFI Discover programme. This partnership will include supporting programmes which aim to enhance STEM awareness, including in education and careers, development of key skills and which provide connections between STEM and the Arts.	Business/ Industry/SFI/ DoE	Ongoing
4.5	Conduct research into developing a model to incentivise broader participation and diversity in teaching through a range of criteria, including an investigation into STEM scholarships and options for STEM specialism at primary level.	DoE/SFI	Medium-term
4.6	Carry out public consultation and develop a policy statement on the use of digital technologies in early learning and care, building on ongoing OECD research.	DCEDIY	Medium-term

Appendix A – List of Acronyms

CPD	Continuing Professional Development
DCEDIY	Department of Children Equality, Disability, Integration and Youth
DFHERIS	Department of Further and Higher Education Research Innovation and Science
DoE	Department of Education
DTCAGSM	Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media
ESCI	Education Support Centres Ireland
EDI	Equality, Diversity and Inclusion
ELC	Early Learning and Care
ESD	Education for Sustainable Development
JCT	Junior Cycle for Teachers
NAMER	National Assessments in Mathematics and English Reading
NAO	National Apprenticeship Office
NSAI	National Síolta/ Aistear Initiative
NCCA	National Council for Curriculum and Assessment
OECD	Organisation for Economic Co-operation and Development
MU	Maynooth University
PDST	Professional Development Service for Teachers
PISA	Programme for International Student Assessment
SAC	School-age childcare
SEC	State Examinations Commission
SFI	Science Foundation Ireland
STEM	Science, Technology, Engineering and Mathematics
STE(A)M	Science, Technology, Engineering, Arts and Mathematics
TAP	Teacher Artist Partnership
TIMSS	Trends in International Mathematics and Science Study

Notes

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