Education Scotland
Foghlam Alba

STEM Nation

STEM Nation Award
Guidance for validators

Smarter Scotland
Scottish Government

The following terminology is used throughout this guidance:

- For the purposes of this document, 'practitioner' is a single term which encompasses all staff and adults who are qualified and or registered to work with children and young people. This includes childminders, early learning and childcare practitioners, teachers, headteachers, setting managers, school support staff and technical support staff.
- The term 'setting' is used to refer to early learning and childcare settings, primary schools, secondary schools and schools or settings which provide specialist provision for learners with additional support needs.
- The term 'learning community' is used to refer to both structured and informal groups of settings where collaboration and joint working takes place. This may include school clusters, associated schools groups, local management groups, joint campuses, schools under shared headship and collaboration between childminders, private nurseries and or local authority early learning and childcare settings.
- The term 'STEM partner' is used to refer to industry partners including employers, further and higher education institutions, academic or professional organisations, third sector organisations and also includes parents or carers who are part of the STEM workforce.
- The term 'STEM partnership' is used to refer to planned and sustained engagement between settings and their STEM partner(s). This is unlikely to include one-off site visits, workshops or competitions.

Contents

Validating evidence for the STEM Nation Award elements

What does the process entail?

Settings follow a simple three step process when applying for elements of the STEM Nation Award:

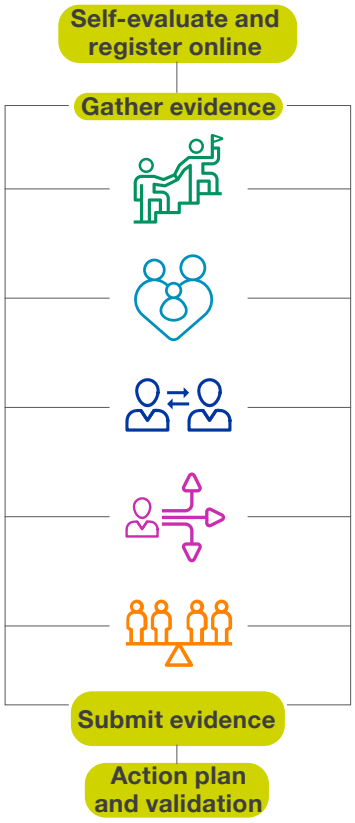
1. **Registration**
2. **Gather and submit evidence**
3. **Action plan and validation**

As a member of the validation team you will be asked to review the evidence submitted by each setting against the evaluation statements on the following pages. These statements summarise our expectations for evidence under three categories: strong, sufficient and insufficient.

It is important to recognise that the STEM Nation Award is open to applications from early learning and childcare settings, primary schools and secondary schools. As a result, the evidence submitted from different types of settings will differ. There is no expectation that evidence will be submitted for every single aspect listed but we do expect to see a range of evidence for each element. Excellent practice in only one aspect is unlikely to demonstrate sufficient evidence for the full element.

In order to help you reach a fair and consistent judgement for all STEM Nation Award applications, we have included examples of what this may look like in different types of settings. These snapshots are included to illustrate some sector-specific approaches but do not form an expected or mandatory requirement for achievement of the element.

The aspects for each element are based on the progression statements in the STEM self-evaluation framework. Settings applying for the



award will have engaged with the framework and the STEM Nation Award application guidance document (available on STEMnation.scot) prior to submitting their application.

After reviewing the evidence, you should decide whether there is strong, sufficient or insufficient evidence for each element. You should record the strengths of the submission along with any suggested areas for development on the STEM Nation Award record. Settings may apply for all five elements together or they may wish to submit their evidence over a longer period, up to three years.

After successfully achieving all five elements, settings are invited to submit a STEM action plan which will inform the final stage of the validation process. A sample action plan is included in the STEM Nation Award application guidance document.

The five elements

Self-evaluate using the STEM self-evaluation framework

Leadership in STEM	STEM family learning	Employability and STEM partnership working	STEM curriculum and learner pathways	Equity and equality in STEM
This element celebrates effective leadership at all levels including children and young people leading STEM learning.	This element recognises commitment to family learning and practice which is helping to build the STEM capital of learners and their families.	This element celebrates sustained collaboration between settings and their STEM partner(s) to develop learners' STEM and employability skills.	This element recognises the work of settings in developing an inspiring STEM curriculum and associated learner pathways.	This element celebrates the work settings are undertaking to address the issues of equity and equality in STEM.

STEM Nation Award

Leadership in STEM

This element celebrates effective leadership at all levels including children and young people leading learning in STEM.

The evidence submitted should demonstrate activity across a range of the following aspects:

- Consultation with stakeholders has helped to build a shared understanding of why STEM is important for learners, their families and the local community. This understanding has helped to shape a clear vision, rationale and plan for STEM in the setting.
- A core team of staff provide effective coordination and leadership for STEM. This leadership is not overly-dependent on one person. Where settings have only one member of staff, this practitioner will be working collaboratively with other practitioners in their learning community.
- Regular opportunities for self-evaluation, professional learning and collegiate working in STEM are being provided. These may be included in working time agreements or professional learning calendars.
- Practitioners are working together to extend their knowledge of STEM curriculum areas and how they relate to the world of work and other priorities in education. STEM pedagogy is being developed and this is enhancing experiences for learners.
- Leadership for STEM at all levels is emerging and practitioners are increasingly taking responsibility for implementing change. Practitioners, learners and stakeholders have taken on shared leadership roles and are helping to motivate, inspire and support others.
- Practitioners use data and evidence of learners' progress in STEM to help meet the needs of learners and promote equity. This could be through tracking and monitoring systems, learner profiles, floor books or similar.
- Learners are increasingly engaged in discussions and decision making about next steps in their own STEM learning. Learners have opportunities to lead others' learning in a classroom or community setting through programmes such as the Young STEM Leader award or other similar schemes.

The examples below give a flavour of what the submitted evidence may look like from each sector.

Early learning and childcare

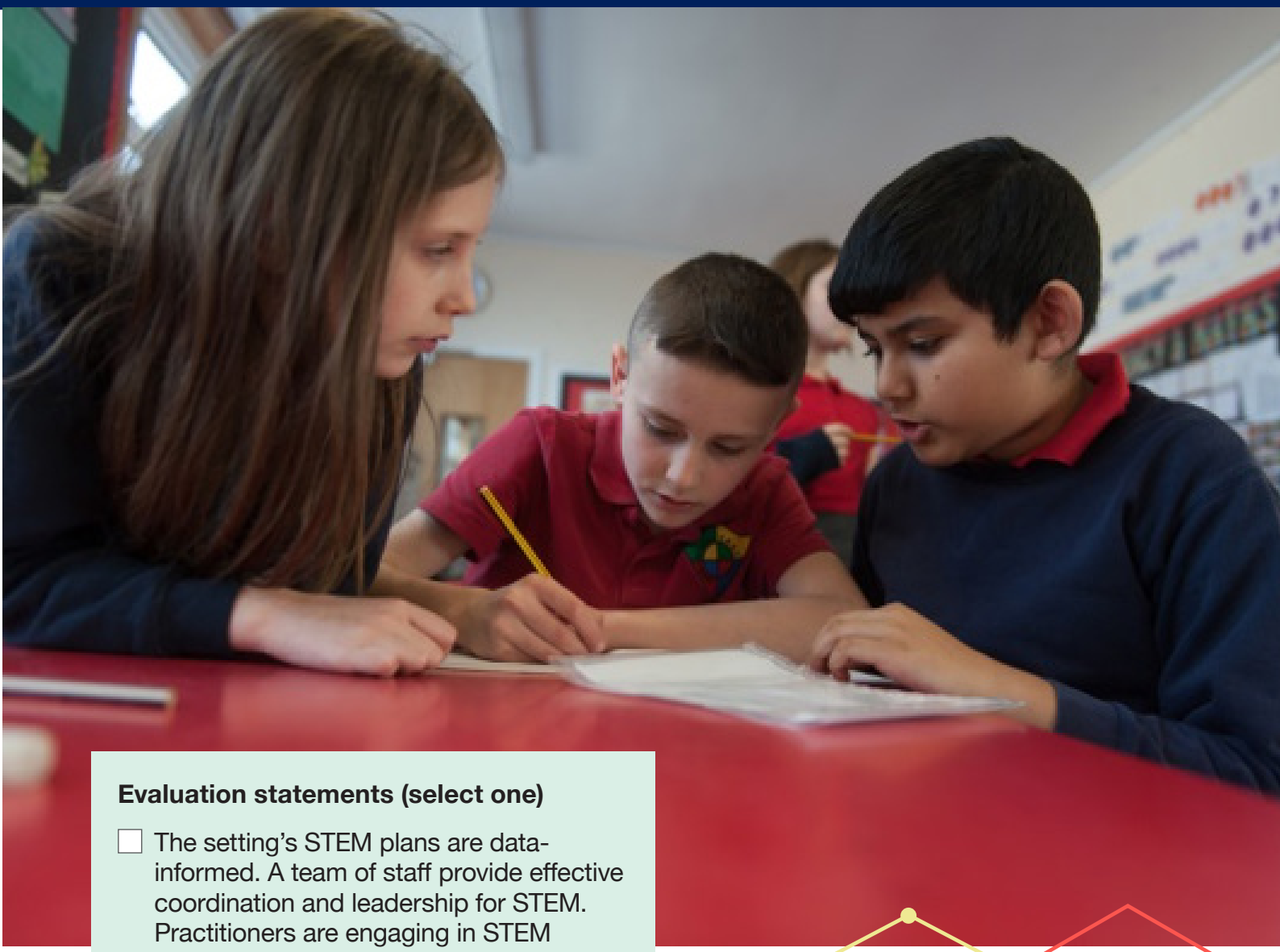
- Practitioners attend our Early Years and Primary STEM Network meetings to share good practice.
- One practitioner is a Digital Leader who delivers professional learning on coding and regularly leads visits to a local care home where children help residents use digital photography apps.
- In our childminding setting, the older children plan STEM investigations based on citizen science projects for the younger children.

Primary school

- The teachers in our STEM Cluster Group meet termly to develop cluster plans, share expertise and then cascade their learning to colleagues.
- Teachers have undertaken practitioner enquiries looking at gender balance, STEM capital and careers education. Their research has been used to inform interventions and curriculum planning.
- Young STEM Leaders design and run monthly STEM challenges for children in the nursery.

Secondary school

- Our STEM Working Group meets monthly and recently delivered a STEM capital professional learning session to all staff on an in-service day.
- Three teachers have taken part in short industry placements, cascaded their learning and used this experience to inform their STEM pedagogy.
- Young STEM Leaders use their two protected periods to plan after-school STEM family learning sessions for younger pupils and their families.



Evaluation statements (select one)

- ☐ The setting's STEM plans are data-informed. A team of staff provide effective coordination and leadership for STEM. Practitioners are engaging in STEM professional learning and are using their learning to inspire and support others. Learners have a wide range of opportunities to take decisions about and lead learning in STEM.
- ☐ There are coherent plans in place for STEM but they may not feature on the setting's improvement plan. STEM leadership is provided mainly by one or two members of staff. Practitioners are informally sharing successes and practice to enhance STEM learning and teaching. Learners are given some opportunities to take decisions about and or lead learning in STEM.
- ☐ Is it unclear who has responsibility for STEM leadership. There is little opportunity for practitioners to work collegiately. Learners lack the opportunity to lead others' learning and have limited choices in relation to STEM.

STEM family learning

This element recognises commitment to family learning and practice which is helping to build the STEM capital of learners and their families.

The evidence submitted should demonstrate activity across a range of the following aspects:

- Relevant, fun and engaging STEM family learning programmes are being developed in partnership with community learning and development groups, third sector organisations and or further education partners. These programmes are helping to build STEM capital for learners and their families.
- Opportunities to engage with STEM in the community such as citizen science projects, industry visits, science centre visits and science festival activities are promoted to learners and their families. Parents and families are actively and meaningfully involved in STEM family learning programmes and activities.
- Practitioners work with parents and families to reduce potential barriers to participation. Parents are being consulted to ensure that their own needs and learning journeys are valued and supported. An increasing number of parents are becoming involved in their children's STEM learning as well as gaining skills of their own.
- STEM features regularly in school or setting events and communications to parents and families. This may involve the use of social media and digital technologies to engage parents and families in STEM learning activities.
- Parents and carers are gaining an understanding of the importance of STEM skills, careers and pathways. This may be evidenced through survey feedback, data showing the number of parents and carers engaging with STEM activities or similar. Where appropriate, a wide range of STEM pathways, including Foundation and Modern Apprenticeships, are promoted to learners and their families.

The examples below give a flavour of what the submitted evidence may look like from each sector.

Early learning and childcare

- We run weekly 'Mini Investigators' sessions. Practitioners teach parents how to carry out simple experiments and try these out with the children in nursery before replicating at home.
- We developed bird and insect surveys for our families to complete at weekends.
- We created take home Maths Bags that families can use at home to explore hands-on maths activities such as measuring ingredients when baking.

Primary school

- We work with a third sector organisation to offer STEM family learning activities for families at risk of social isolation over holiday periods.
- Our Parent and Carers STEM Working Party helps us to identify and address barriers to STEM participation and parental engagement.
- We use our social media account to share the STEM learning taking place in school and ask families to share pictures of learning at home.

Secondary school

- Our STEM club ran a 'Stop the Spread' challenge where children worked with their family at home to build a hand washing device as part of their CREST Discovery Award.
- Parents and families of new S1 pupils were invited to our school in the summer term to join in with a STEM family learning challenge.
- Our Careers Advisor runs parental information sessions to promote apprenticeship pathways.

Evaluation statements (select one)

- ☐ A broad range of parents and carers are active participants and contributors to family learning programmes which build STEM capital. Parents and carers are aware of the importance of STEM skills and have a good understanding of learners' progress and achievements in STEM.
- ☐ Practitioners are aware of the concept of STEM capital and are actively encouraging learners and their families to participate in STEM family learning events in the setting and or local community. Learners' achievements in STEM are shared with parents and carers.
- ☐ The setting is not actively leading or supporting STEM based family learning opportunities. Practitioners show limited knowledge of the concept of STEM capital or the barriers to participation faced by families. Details of learners' progress and achievements in STEM are not regularly shared with parents and carers.

Employability and STEM partnership working

This element celebrates sustained collaboration between settings and their STEM partner(s) to develop learners' STEM and employability skills.

The evidence submitted should demonstrate activity across a range of the following aspects:

- The setting has established a sustained partnership with at least one STEM partner. Partners may include industry partners and STEM employers, further and higher education institutions, academic or professional organisations, third sector organisations and or parents or carers who are part of the STEM workforce. The setting is working collaboratively with their STEM partner(s) to plan, deliver, monitor and evaluate joint activities which inspire learners.
- STEM partnership work is supporting the professional learning of practitioners and is helping to build practitioner's leadership capacity. The support of STEM partners has helped practitioners relate learners' skills development to future careers in STEM and develop a range of appropriate learner pathways.
- Work with STEM partners is enhancing learners' employability and career management skills, as outlined in the Career Education Standard (3 – 18). Where appropriate, activities are aligned with the Work Placement Standard and the Guidance on School/Employer Partnerships.
- Work with STEM partners is helping to promote positive perceptions of STEM that challenge stereotypes and preconceptions. This work may include but should not be limited to "girls into" events. Practitioners are aware of the key STEM industries in their local area and, where appropriate, take account of labour market information when planning events such as careers fairs and STEM talks. The setting has worked with their STEM partner(s) to plan a range of learning pathways in STEM.

The examples below give a flavour of what the submitted evidence may look like from each sector.

Early learning and childcare

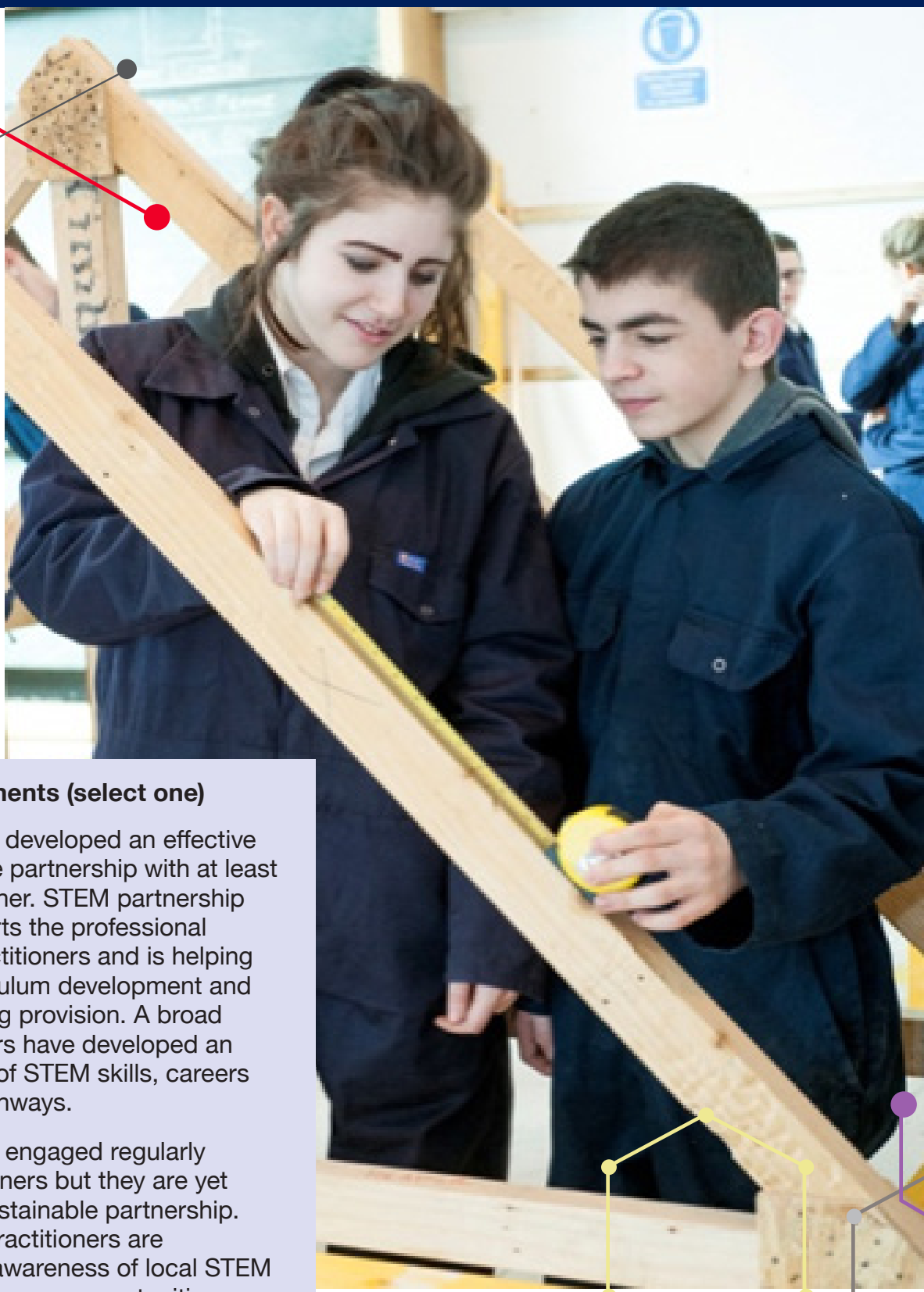
- Regular visits from our local ranger have helped learners explore and understand the wildlife in the family centre garden.
- Young STEM Leaders from the local secondary school helped practitioners plan and deliver a water rocket experiment in our nursery.
- A local manufacturing firm makes regular donations of surplus materials to help practitioners develop our loose parts play area.

Primary school

- STEM Ambassadors supported the 'World of Work' day by giving short presentations to learners to explain the nature of their jobs.
- As part of a design project, a local architecture firm helped learners create scale models of their dream home.
- College staff worked collaboratively with teachers to develop low cost resource boxes which can be used in class to deliver hands on STEM lessons.

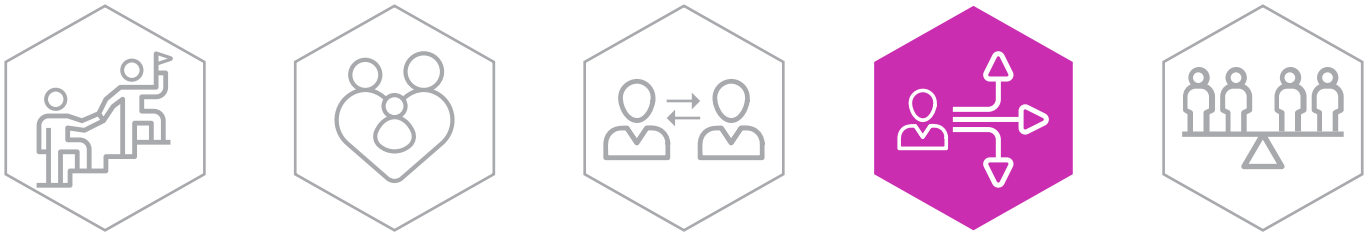
Secondary school

- A logistics firm delivered a professional learning session to increase teachers' knowledge of how efficient container packing is used in industry.
- A partnership agreement with a local construction firm helped to provide work placements and apprenticeships for learners.
- College staff worked with teachers to support learners' investigations which required the use of the college's specialist equipment.



Evaluation statements (select one)

- ☐ The setting has developed an effective and sustainable partnership with at least one STEM partner. STEM partnership working supports the professional learning of practitioners and is helping to inform curriculum development and improve learning provision. A broad range of learners have developed an understanding of STEM skills, careers and learner pathways.
- ☐ The setting has engaged regularly with STEM partners but they are yet to develop a sustainable partnership. Learners and practitioners are developing an awareness of local STEM industries and career opportunities through engagement with STEM partners.
- ☐ STEM partnership activity is not linked with planned learning opportunities and is having limited impact on learners' attitudes and progress.

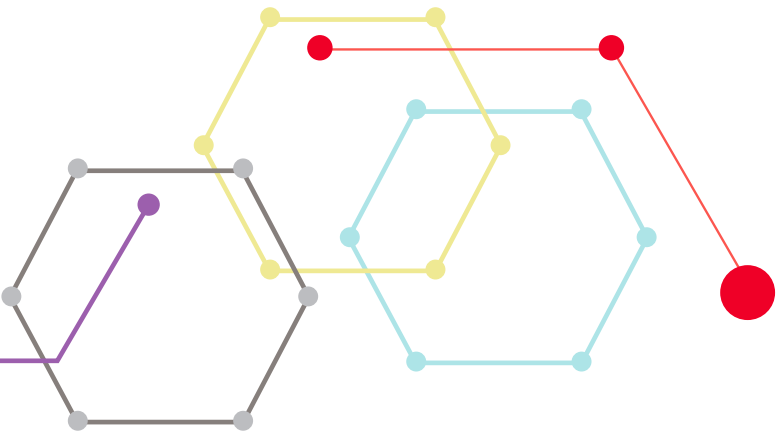


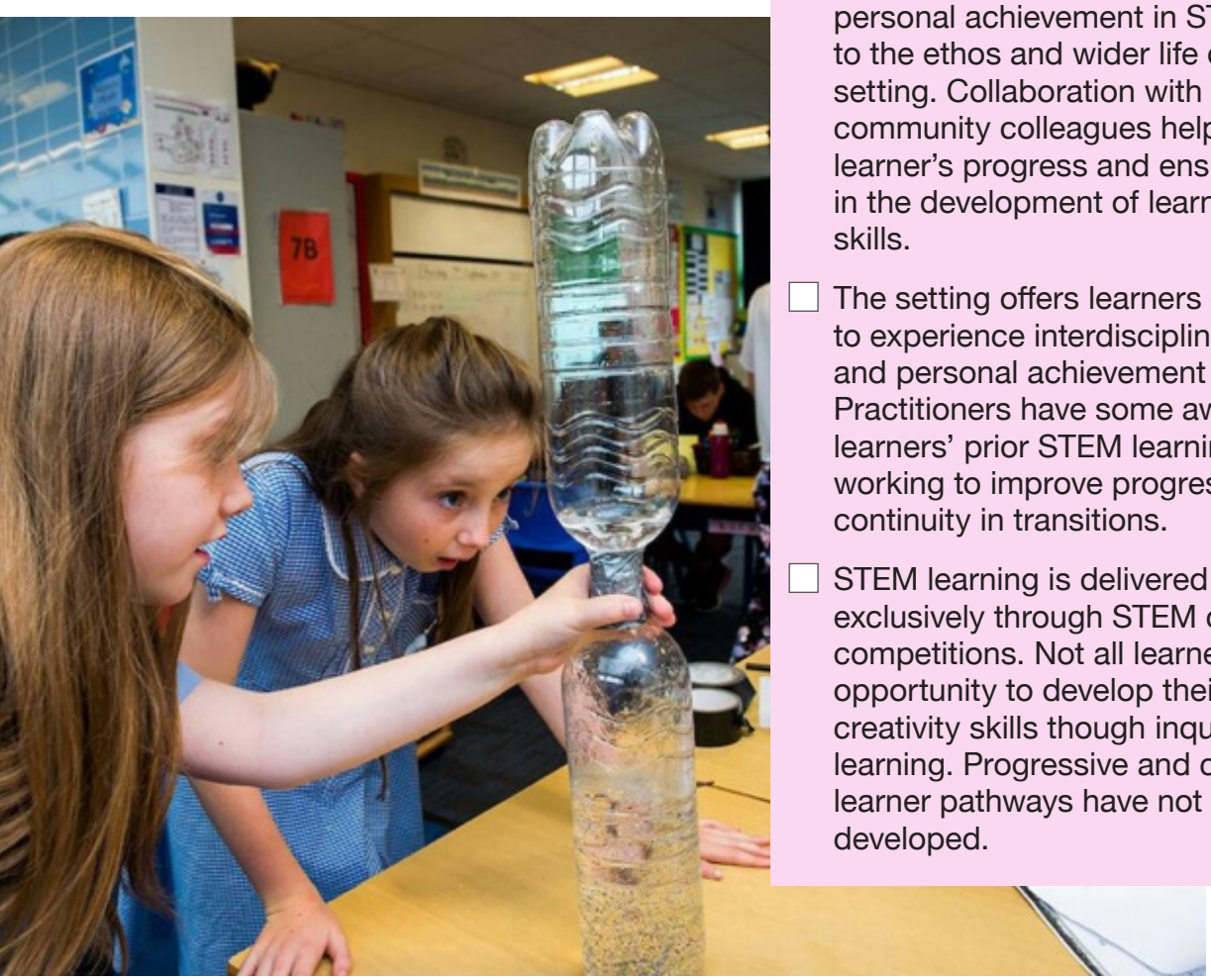
STEM curriculum and learner pathways

This element recognises the work of settings in developing an inspiring STEM curriculum and associated learner pathways.

The evidence submitted should demonstrate activity across a range of the following aspects:

- Practitioners are delivering STEM through the four contexts of learning: curriculum areas, interdisciplinary learning, personal achievement and the wider life of the school/setting. This may include community and family learning events and or learner participation in STEM awards programmes. STEM is being used as an engaging context to deliver and make links between the STEM curriculum areas, literacy, numeracy, Learning for Sustainability and digital literacy.
- Through engaging with motivating and challenging inquiry-based STEM learning experiences, learners are developing a wide range of STEM and creativity skills, including curiosity, open-mindedness, imagination and problem solving. Where appropriate, practitioners are supporting learners to develop these skills through play, active learning and outdoor learning.
- Practitioners work in collaboration with learning community colleagues to plan for continuity and progression in STEM learning. Transition arrangements and activities are building the confidence and resilience of learners in STEM.
- STEM learner pathways have been designed to meet the needs of all learners. The setting is taking steps to help learners develop a belief in their own abilities and reduce barriers to participation in STEM. The support provided for learners and their families helps learners to make informed choices about STEM learner pathways.
- The curriculum has been influenced by local labour market information and is helping to prepare learners for a variety of STEM careers. Practitioners encourage all learners to develop a wide range of skills. In secondary schools, STEM is a feature of the broad general education and continues to provide engaging learning opportunities for learners in the senior phase.





Evaluation statements (select one)

- ☐ A broad range of learners are engaging with STEM through interdisciplinary learning and learning in discrete curriculum areas. Opportunities for personal achievement in STEM contribute to the ethos and wider life of the school/setting. Collaboration with learning community colleagues helps to secure learner's progress and ensures continuity in the development of learner's STEM skills.
- ☐ The setting offers learners opportunities to experience interdisciplinary learning and personal achievement through STEM. Practitioners have some awareness of learners' prior STEM learning and are working to improve progression and continuity in transitions.
- ☐ STEM learning is delivered almost exclusively through STEM clubs and competitions. Not all learners have the opportunity to develop their STEM and creativity skills though inquiry-based learning. Progressive and coherent STEM learner pathways have not yet been developed.

The examples below give a flavour of what the submitted evidence may look like from each sector.

Early learning and childcare

- The tinker table in our nursery allows children to develop their fine motor skills when assembling or disassembling existing items and new creations.
- We use an online profiling tool to capture and share photographs of our children's learning. Our STEM tag helps us to identify connections.
- Child-led learning in STEM allows us to build on children's interests and introduce new concepts. Children were intrigued by the ice outside so we then went on to investigate liquid water and steam in our kitchen.

Primary school

- Teachers across our cluster have worked collaboratively to develop science progression pathways and associated assessments.
- Our STEM Masterclasses allow pupils to experience a variety of STEM careers.
- We use play pedagogy in our 'Muddy Movers' programme to develop STEM skills outdoors.
- Learning for Sustainability is the key theme of our cluster's P7/S1 transition programme.

Secondary school

- Our STEM interdisciplinary learning programme allows our S2 pupils to experience learning in three different engineering disciplines.
- Throughout S1 to S3 all pupils take part in one period of 'STEM Numeracy' per week. This course focusses on using numeracy skills in new contexts and is taught by non-maths specialists.
- Our S5/S6 pupils gain valuable skills and work experience through Foundation Apprenticeships.

Equity and equality in STEM

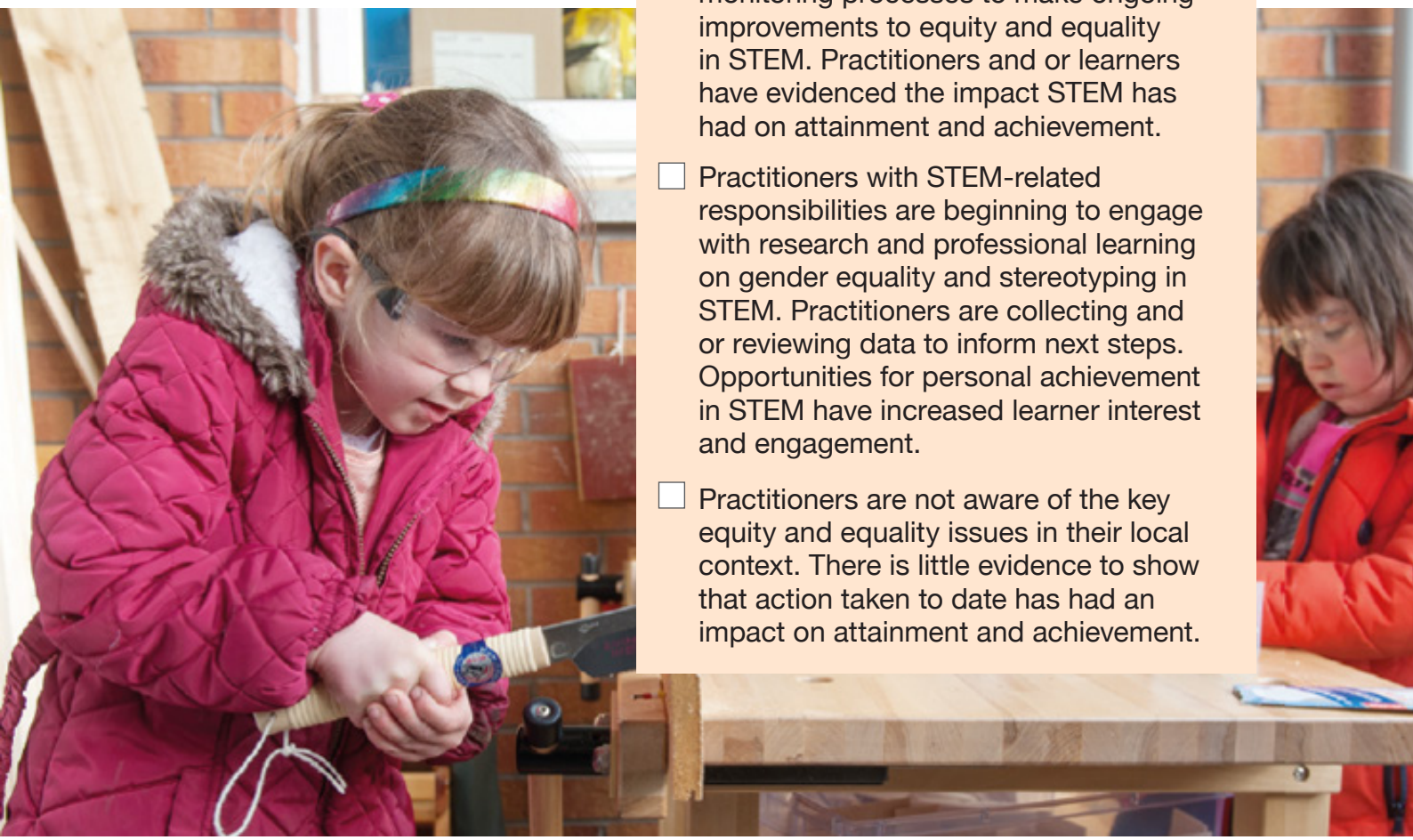
This element celebrates the work settings are undertaking to address the issues of equity and equality in STEM.

The evidence submitted should demonstrate activity across a range of the following aspects:

- Practitioners are aware of the main equity and equality issues facing learners in their local context. This may vary significantly between urban, rural and remote areas. Together, practitioners across the setting are taking steps to improve gender balance, equality of opportunity, equity, diversity and inclusion through STEM.
- Practitioners have engaged with research and or professional learning on gender stereotypes and unconscious bias. The setting is taking action to challenge these stereotypes and address practitioners' own unconscious bias. This action is sustained and involves staff across the setting.
- Learners across the setting are given opportunities for personal achievement in STEM. This may include involvement with the Young STEM Leader programme or other STEM award schemes.
- Practitioners work with learning community colleagues, learners and their families to challenge preconceptions about STEM careers and learner pathways. Practitioners actively seek opportunities to celebrate diversity in the STEM workforce with all learners.
- The setting's tracking and monitoring processes are helping practitioners to plan interventions for individuals or groups to ensure that all learners have appropriate opportunities to develop their STEM skills, particularly for learners who face additional barriers. These processes are likely to look different in early learning and childcare settings, primary schools and secondary schools but should all help to inform practitioners knowledge and understanding of learner's progress and help to achieve equity.
- Practitioners and or learners are able to give examples of where STEM learning has had a positive impact on attainment and achievement in literacy, numeracy, health and wellbeing and across STEM curricular areas. This may include increased confidence in using numeracy skills in unfamiliar contexts or examples where an exciting STEM context has increased interest and engagement.

Evaluation statements (select one)

- ☐ Staff across the setting have engaged with professional learning and are confident challenging preconceptions about career and learner pathways. The setting is using data and or evidence from their tracking and monitoring processes to make ongoing improvements to equity and equality in STEM. Practitioners and or learners have evidenced the impact STEM has had on attainment and achievement.
- ☐ Practitioners with STEM-related responsibilities are beginning to engage with research and professional learning on gender equality and stereotyping in STEM. Practitioners are collecting and or reviewing data to inform next steps. Opportunities for personal achievement in STEM have increased learner interest and engagement.
- ☐ Practitioners are not aware of the key equity and equality issues in their local context. There is little evidence to show that action taken to date has had an impact on attainment and achievement.



The examples below give a flavour of what the submitted evidence may look like from each sector.

Early learning and childcare

- STEM Ambassadors have spoken to our children about their jobs. We have tried to arrange for adults in non-stereotypical roles to visit the nursery including a male nurse and a female mechanic.
- We have established a team of 'Equity Champions' who have engaged with professional reading on a range of equity and equality issues and regularly cascade this learning to colleagues at team meetings.

Primary school

- When working on an engineering project our P5 class used video calls to speak to pupils in a city-centre school about the differences between transport systems on our island and in the city.
- We work with secondary colleagues to evaluate the impact of our STEM curriculum on senior phase course choices by conducting pupil surveys in P5 and again in S3. We are starting to see more diversity in the group of learners choosing to study STEM.

Secondary school

- We use a whole school tracking system to monitor our pupils' STEM engagement and attainment within and outwith class. We use this data to plan and evaluate interventions.
- Our STEM club runs monthly 'Bring a friend' sessions which has helped to increase the diversity of pupils attending the club.
- All staff in our school participated in unconscious bias training at a recent in-service day.

Validation conversation

The STEM Nation Award validation process concludes with a conversation between the applicant and the validation team. Validation will be completed on a regional basis and therefore local arrangements may differ slightly. The most up-to-date information for validation in each region is available on STEMnation.scot.

Prior to the validation conversation, each member of the validation team will be provided with a copy of the setting's STEM Nation Award record and STEM action plan. You should familiarise yourself with these documents in order to engage in dialogue with the applicant about STEM in their setting.

Key points to consider when reviewing the STEM action plan:

- How do the setting's future plans support the key aims of the STEM strategy: excellence, equity, inspiration and connection?
- How does the setting intend to share their learning and successes with practitioners in other settings?
- What opportunities exist for collaborative working across a learning community, local authority or region? How could this work be supported by local community or industry partners?

Applicants will be encouraged to reflect on the STEM journey of their setting prior to the final stage of validation. The validation conversation should be positive, supportive and should provide the applicant with an opportunity to elaborate on the setting's strengths and successes as highlighted in their STEM Nation Award record.

The validation conversations across the country will follow a similar format. Each conversation will be based around three key questions and should last approximately 30 minutes. The validation team should take a relaxed, conversational approach and should focus on examples of interesting and innovative practice.

Validation conversation key questions

What impact is STEM having on the learners in your setting?

- How has STEM helped to excite, motivate and engage children and young people in their learning?
- What impact has STEM had on attainment in your setting?
- Which approaches have helped to improve equity and equality in STEM?

What challenges have you faced and how have you overcome these?

- What supports were put in place to develop STEM pedagogy and practitioner confidence?
- How have you incorporated STEM into your timetable and or planning?
- What advice would you give to colleagues in other settings just starting out with STEM?

What excites you most about your setting's future STEM plans?

- How might you share these developments with other settings?
- How could you work in collaboration with other settings or partners to realise your ambitions?

If required, you may wish to use the supplementary questions or short prompts from the setting's STEM Nation Award record to keep the conversation flowing.

The validation conversation is the final stage of quality assurance before a setting is presented with their STEM Nation Award. Feedback from the STEM action plan and the validation conversation should be recorded on the STEM Nation Award record. This will be shared with the setting when the award is issued.

The STEM Nation Award is valid for a period of three years after which settings will be asked to submit updated evidence and participate in a further validation conversation. The validation conversation for the renewal of a STEM Nation Award will follow the same format as described above.

Appendix:
STEM Nation Award record

SEED/CS number	Name of setting	Local authority

The five elements	Evidence	Strengths	Areas for development	Date reviewed
Leadership in STEM	☐ Strong ☐ Sufficient ☐ Insufficient			
STEM family learning	☐ Strong ☐ Sufficient ☐ Insufficient			
Employability and STEM partnership working	☐ Strong ☐ Sufficient ☐ Insufficient			
STEM curriculum and learner pathways	☐ Strong ☐ Sufficient ☐ Insufficient			
Equity and equality in STEM	☐ Strong ☐ Sufficient ☐ Insufficient			

Action plan	
Date reviewed	**Comments**

Validation	
Date reviewed	**Comments**
Award renewal date:	

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Version control

Document version	Date of publication	Description of changes
1.0	July 2020	Original version