Support for Primary Science in Moray

In summary, these materials aim to:

- Help schools evaluate their current science curriculum using the STEM Self-Evaluation Framework.
- Provide a focus for dialogue with schools & practitioners within an ASG to work collaboratively to develop their BGE science curriculum within a local context taking account of National Guidance.
- Provide support for schools by drawing together examples of bundling, Science E&O progressions, Science skills progressions and links to the National BGE Guide (Education Scotland) and other resources that schools could adopt or adapt to their needs.
- Provide practitioners with a bank of resources for planning lessons.

STEM Moray blog site: https://blogs.glowscotland.org.uk/my/morayscience/ is a public facing site with a number of the resources referred to in this document. This is to allow easier access for partner establishments.

Science for Primary & Early Years (SPEY) on the Moray Council GLOW Site has all the Documents referred to in this booklet (requires a GLOW Login)
https://glowscotland.sharepoint.com/sites/MorayCouncil/curriculum/spey

Documents Store Folder – Moray Primary Science Resources 2018-19

- ASG Science Transition Materials
- STEM Self Evaluation Framework
- National BGE Science Guide – Samples
- Moray Science Skills Progressions & Pupil Materials
- Moray Science Progression Pathway Example
- Moray Bundling and Progression Examples
- PSDO Created Resources
- Primary & Secondary Engineer Support materials
- Sciences Benchmarks & Benchmarks with additional links March 2017
- Early Level Sciences Benchmarks & activities
- Technologies Benchmarks

If you feel that anything else needs to be transferred to the public facing site for ease of access, please get in touch with janey.irving@moray.gov.uk

In addition @MorayScience on Twitter is a place to share good practice; hear the most up to date Science or STEM news. Please use the #STEMMoray and #RAiSEScot to share with others!

The STEM Moray Newsletter published in Aug 2018 has information about the projects being piloted in Moray as part of the RAiSE Initiative as well as launching a STEM Establishment of the Month and STEM Job of the Month to engage and inspire. This Newsletter links with the STEM Moray blog and an electronic newsletter will be issued termly.

STEM Self Evaluation Framework

In December 2017 Education Scotland published a STEM self-evaluation and improvement framework for early learning and childcare, ASN, primary and secondary schools on the National Improvement Hub:

https://education.gov.scot/improvement/learning-resources/stem-self-evaluation

What is this?

This framework can be used to stimulate dialogue and action towards a whole setting approach to sciences, technologies, engineering and mathematics (STEM). It can serve as a helpful guide or route map for settings looking to self-evaluate and improve their approach to STEM using the quality indicators within How Good Is Our School? and How Good Is Our Early Learning and Childcare? The framework has been aligned to expectations within the STEM Education and Training Strategy, Developing the Young Workforce and other priorities in education.

How to use this self-evaluation approach to improve practice

Two versions of this STEM framework have been produced. One version has been developed for STEM coordinators and senior leaders. A two-page summary version for practitioners has also been produced. The framework includes challenge questions and a series of progression statements for relevant quality indicators to help settings reflect on and plan improvements in relation to STEM.

How to get started

If you are starting on your journey pick one or two relevant QIs to provide a focus in your school/ASG. For example if you wanted to evaluate your current curriculum in light of the National Guidance (Science Benchmarks), you might choose:

QI 1.1 Self-evaluation for self-improvement. We look inwards with staff, learners and partners to self-evaluate our STEM approaches. We are identifying initial strengths and areas for improvement. We have started to gather evidence about the quality of learning and teaching in STEM and progress of learners. We are engaging with the Career Education Standard to reflect on current practice. We are beginning to look outwards to learn from others. We use our self-evaluation to look forward and plan our next steps.

QI 2.2 Curriculum. We engage with STEM challenges, themed weeks and events to build our confidence and understanding of STEM and to help us develop our curriculum. We develop the rationale and design of our STEM curriculum collegiately. We are learning to weave sciences, technologies, engineering, mathematics and digital skills together. We are trying new pedagogies to develop STEM skills for learning, life and work through play and active learning.

Sciences Benchmarks

In March 2017 Education Scotland published finalised Benchmarks for all curriculum areas including Science.

What is this?

Along with Experiences and Outcomes, the Benchmarks were designed to provide clarity on the national standards expected within each curriculum area, set out clear lines of progression, to make clear what learners need to know and be able to do to progress through the levels, and to support consistency in teachers' and other practitioners' professional judgements.

https://education.gov.scot/improvement/documents/sciencesbenchmarkspdf.pdf

Another version of the Sciences Benchmarks document has been made available in response to requests from practitioners who participated in the Benchmark consultation process.
This version suggests links between sciences Experiences and Outcomes and other Experiences and Outcomes, with a particular emphasis on literacy, numeracy and health and wellbeing.
Possible links to mathematics and the newly-revised technologies Experiences and Outcomes have also been added to help support STEM (sciences, technologies, engineering and mathematics) approaches.
Apart from these suggested links, this version of the Sciences Benchmarks document is identical in every other aspect to the one published in March 2017 on the National Improvement Hub. The links identified are suggestions only and do not need to be followed - schools and centres should bundle Experiences and Outcomes to suit the needs of their learners and their local contexts.

Sciences Benchmarks with Additional Links – on Moray Council GLOW Group SPEY (Science for Primary & Early Years)

How to get started

Whichever version of the Sciences Benchmarks you decide to use in your school, it is vital that practitioners read and discuss the first few pages of the document (preface). This makes it clear the purpose of these documents and their role in moderation of planning learning, teaching and assessment processes.

In Moray we are encouraging practitioners to incorporate more opportunities for development of science skills as shown in the Benchmarks for Inquiry & Investigative Skills, Scientific Analytical Thinking Skills and Skills and Attributes of Scientifically Literate Citizens.

These skills show a clear line of progression from early to fourth level and are also transferable skills that will benefit pupils in a range of subjects.

National BGE Science Resource Guide

In January 2018; Primary Science Development Officers from Local Authorities engaged in the Raising Aspirations in Science Education (RAiSE) Initiative coordinated by Education Scotland started working on a National BGE Science Resource Guide. Although this is not yet complete I have included some samples on the SPEY GLOW Page in the folder marked:

What is this?

The National BGE Science Resource Guide is designed by practitioners for practitioners; to give support and ideas for teaching Science.
We have included/incorporated:

- Prior Knowledge
- Benchmarks for Assessment
- Suggested Learning Experiences
- Common Misconceptions
- Skills
- Glossary of Key Vocabulary
- Key Questions
- IDL Opportunities
- Suggested Assessment
- Online Links
- Extended Learning
- Science Capital
- DYW Links

How to get started

This resource is currently under development; however Highland LA created a comprehensive resource for every E&O that can be found by following this link:
https://glowscotland.sharepoint.com/sites/TheHighlandCouncil/cadosteamsite/Science/primaryscience/SitePages/Home.aspx

The PSDOs/Education Scotland are looking for teachers who would be interested in working with PSDOs to develop the Guide. If you are interested or want to find out more, please get in touch with Janey Irving janey.irving@moray.gov.uk

In March 2018, the Moray Primary Science Working Group met to develop a variety of resources to support teachers in Moray with Primary Science.
In addition as PSDO I have been collating materials from a number of Moray Schools/ASGs over the last session. If you could contribute to this Moray-wide resource, please get in contact with janey.irving@moray.gov.uk

1 - Moray Science Progression Pathway Example

What is this?

We recognised that many of the Science E&Os which were in the same level nevertheless had varied levels of complexity for our pupils. We devised this suggested progression pathway to reflect this by placing particular E&Os in particular primary school years. There is a Progression Pathway for each curricular area. We envisage schools using this if they are revisiting their Science E&O bundles and hope that this will support them in this process.

How to use these examples to improve practice

These examples could be used as a starting point to discuss your own curriculum. Would it be helpful to move some of the E&Os around so you focus on particular ones in P1 or P4 for example?

How to get started

Things to consider when working on your science curriculum:

- Science as a context for teaching Literacy, Numeracy, Health & Wellbeing and Digital Skills. Functional/Instruction Writing or Report writing are key aspects of Literacy Outcomes but what about creative writing in Science – Science Fiction becoming reality? Research/Debate of cutting edge topical science and ethics. Presenting information, calculating averages, drawing graphs are key numeracy skills that can be taught through science. There are obvious links to H&WB when considering Biological Systems E&Os in science. But how about linking Vibrations & Waves (Light) to the eye and seeing to finding out about visual impairment. This could even lend itself to a visit from an optician and finding out about their job (Career Education Standards)
- Science as part of STEM – many outcomes lend themselves to being part of the larger STEM context. E.g. When teaching aspects of Forces, you may wish to build a boat and test it. This would also cover Technologies outcomes and wold help develop pupils Engineering Skills. Pupils would need to use measuring skills when planning, designing and creating the vessel and may also use measurement of time and distance to compare the speeds of the vessels.

2 - Moray Examples of Progression and Bundling

What is this?

Some of the schools in Moray have shared their Science Progressions and Bundling. As we have many different schools in terms of size and local context, at this stage we could not create a definitive Science Progression that would suit all schools in Moray. Instead we would like to build a bank of examples from various schools with the view that sharing ideas and examples that have been tried and tested will help support those schools who are revisiting their Science curriculum.

How to use these examples to improve practice

Sharing good practice from across Moray allows us all to look outward at other schools approaches to their Science Curriculum and will help us self-evaluate our current practice.

How to get started

This resource is currently under development; we have a few examples but would like to build up this resource over this session:

If you would be able to add your school's examples or are interested in developing a Moray Science Progression, please get in touch with Janey Irving janey.irving@moray.gov.uk

3 - Moray Science Skills Progressions & Pupil Materials

What is this?

The Primary Science Curriculum Working Group met to create a Moray Science Progression for Skills. We looked at the Science Benchmarks for Investigative & inquiry Skills, Scientific Analytical Thinking Skills and Skills and attributes of scientifically literate citizens and worked on exemplifying these for practitioners starting with Presenting Scientific Findings (Early – Second Level). We will continue to build a bank of examples from various schools with the view that sharing ideas and examples that have been tried and tested will help support schools in moderating aspects of the Science Curriculum.

How to use these examples to improve practice

Sharing good practice from across Moray allows us all to look outward at other schools approaches to their Science Curriculum and will help us self-evaluate our current practice. We have worked with the Speyside ASG to create pupil materials to support Investigative & Inquiry Skills including adaptation of Flipchart (Post-It Note) planning and Investigation Booklets. Within the Speyside ASG these are being used to support pupils development of these skills and as a mode for developing a fluid transition from Primary to Secondary in Science.

How to get started

This resource is currently under development; we have a few examples but would like to build up this resource over this session:

If you are interested in developing an ASG wide approach to Science and in particular progression of Science Skills or wish to add your school's examples or are interested in developing a Moray Science Skills Progression, please get in touch with Janey Irving janey.irving@moray.gov.uk

4 – Early Years Benchmarks plus suggested Activities

What is this?

At one of the CPD sessions to support Science in Early Years; practitioners from across Moray shared examples of Science activities they use for each Experience & Outcome in Science. This was collated along with the E & O's and Benchmarks and provides a bank of tried and tested ideas.

How to use these examples to improve practice

Sharing good practice from across Moray allows us all to look outward at other approaches to the Science Curriculum and will help us self-evaluate our current practice.

How to get started

Although this resource is fairly comprehensive; this is a working document and I would be very happy to add to this with more ideas from Moray practitioners. Similarly over this session I am planning to gather ideas for a first and second level bank of activities.

If you would be able to add examples or would like to help creating these, please get in touch with Janey Irving janey.irving@moray.gov.uk

5 – ASG Science Transition Materials

What is this?

The Lossiemouth ASG have worked together over the last two sessions to develop a Science Transition project called Planet X. This involved a termly Science Lesson for P7 pupils based on E&Os, a STEM Challenge to Create a Hab to live on Planet X and covers Biology, Chemistry and Physics disciplines. It culminates in a visit to the Secondary School with further STEM Challenges and a Showcase of their work.

Over session 2017-18 the Forres ASG worked together to develop an approach to transition in Science from Primary to Secondary school. They focussed their work on the Science Skills and developed a Science Skills Passport

How to use these examples to improve practice

These materials can be used to support discussion about your ASGs approaches to planning science transition. Sharing good practice from across Moray allows us all to look outward at other schools approaches to their Science Curriculum and will help us self-evaluate our current practice.

How to get started

Reflect on your ASG – working together on a Science or STEM Transition provides opportunities to develop closer links with Primary schools and Secondary STEM departments. Each approach though very different did require collegiate working to develop this over the course of at least a year. As PSDO I am available to support your ASG with this work and have already been working with Speyside ASG and Milnes ASG on their Science Transition. Each time something new is developed and shared we build a bank of resources to benefit all Moray Schools.

If you would be able to add examples or would like to help creating these, please get in touch with Janey Irving janey.irving@moray.gov.uk

6 – PSDO Created Resources

What is this?

Over session 2017-18 I had the pleasure of working with a number of schools either to support Science in their establishment over a number of weeks or to support STEM days/ weeks. Any materials I have produced have been placed in a folder on GLOW entitled PSDO Created Resources within SPEY – Documents Store Folder – Moray Primary Science Resources 2018-19.

How to use these examples to improve practice

These materials include examples of lesson planning created with experienced early years and primary colleagues from across Moray. These can be used to support discussion about your schools approaches to planning science lessons as well as providing ideas for teaching some E&Os.

How to get started

This folder contains examples of activities that I have conducted with pupils over session 2017-18 and is by no means comprehensive in covering all Science E&Os. I will continue to add to the materials over next session.