Education Scotland
Foghlam Alba

The Sciences 3-18

Good practice examples

September 2013

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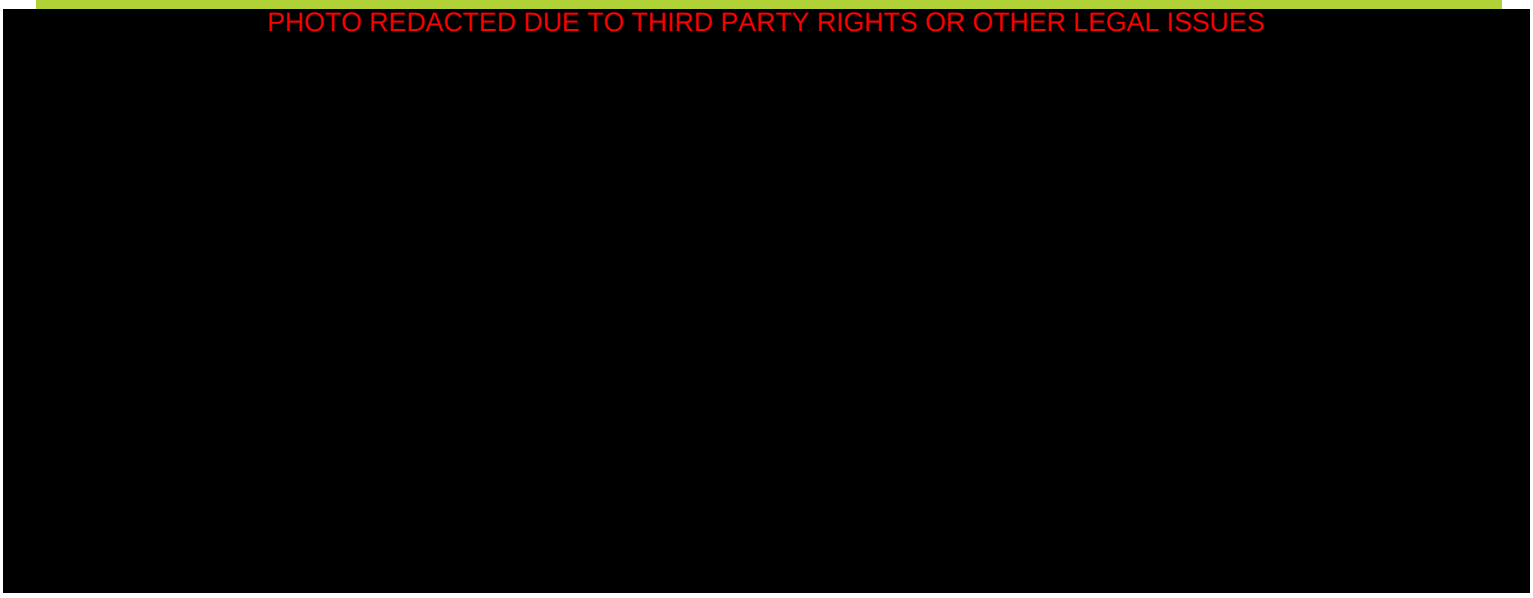


Transforming lives through learning

Introduction

This document provides practitioners with a compilation of good practice in the sciences which has been drawn from the updated version of the Sciences 3-18 Curriculum Impact Report (Sept 2013). This document has been produced in response to requests from practitioners who found the many good practice examples in the report helpful and suggested they be collated into a separate document.

The examples listed below highlight the many ways that learners' skills, knowledge and understanding in the sciences are being developed through effective learning and teaching and partnership working.

The examples have been categorised under the following headings: early years, special schools, primary schools, secondary schools, education authorities and partnership working.

Early years

Good Practice Example 30

In a pre-school nature kindergarten, the children spend almost all of their time outdoors. This provides them with a rich natural environment which is used very effectively to promote early science skills and develop children's interests in living things. Effective shared planning for learning allows children the space and time to explore and discover their natural environment. This is supported by well-timed and skilful interactions with staff. Children are developing their powers of observation and investigation very well. They are well aware of change and its effects on them, for example, their own growth, changes in weather, trees, flowers and plants. Children enjoy observing living things, for example, they know where to find the 'toad' outdoors in the garden. They are learning about planting and growing and know that you need sunshine and rain to make some things grow for example, carrots, peas, onions, strawberries, tomatoes, planting trees. Through their daily walks into the wild wood, children explore their natural environment and fulfil their inquiry, creativity and problem-solving skills.

Good Practice Example 38

One pre-school centre identified science through their self-evaluation as a curriculum area they needed to develop. The staff wanted to take a fresh approach that would maximise what they knew interested children and wanted also to try to make meaningful learning links between the centre and home. Staff invited parents to plan with them and develop a shared understanding about what science means. They used children's interests in everyday things, such as, cooking, puddles and electricity, as starting points to develop a set of science boxes for children to use with parents at home. This link proved popular with children and parents alike. Parents commented positively on this 'quality time' being spent with their child.

Special schools

Good Practice Example 19 - New to this updated version of the report

One special school has utilised its very strong cluster partnership with a local secondary school to plan and develop a whole school sciences learning programme. The programme is planned taking into account each learner's level of skill, knowledge and understanding. Careful planning ensures that each learner has access to a broad general education, including those with more complex needs. One creative project was planned to develop learners' STEM skills. This was planned in partnership with the technologies department from a local secondary school and involved designing and building bird boxes. It was delivered through a challenging real-life context, developing learners' creativity, team working and problem solving skills. This partnership approach provided shared activities and experiences for learners and gave them access to the specialist equipment required to construct the bird boxes to scale and use engraving tools to make box house plaques. Learners developed their confidence and presentation skills through showcasing their skills, knowledge and understanding at the National Science and Engineering Week and parent workshops. Learners' self-esteem will be enhanced through the display of the boxes in the school grounds as part of the school Grounds for Learning programme.

Good Practice Example 31

In a special primary school, children with complex needs are motivated by high-quality learning experiences which ensure that they are actively involved in their own learning. Almost all of the time they participate enthusiastically in lessons and show confidence and enjoyment in learning. Effective community learning partnerships enhance learning. Children regularly visit local community facilities. They also carry out activities in the school grounds to enhance the environment. In the sciences, children know about aspects of nature, for example, through exploring outdoors. They also use their senses when working with ingredients e.g. using cornflour mixed with red colouring, making playdough and watching ingredients change during cooking processes. Children are actively involved in making and watching activities around their bird feeders. Effective use is also made of photographs to track and assess progress both in school and at home.

Primary schools

Good Practice Example 1

Primary schools working together across a cluster organised a residential experience focusing on outdoor learning for P7 children. The children developed their knowledge of conservation through working in the outdoor environment. Their learning was recognised through achievement of a John Muir Award.

Good Practice Example 4

In a primary school, children used a webcam and a motion sensor to monitor the variety and quantity of birds that visited wildlife boxes in the school grounds, over a period of time. The children used and developed numeracy skills as they gathered, analysed and presented data in an appropriate manner. They compared and contrasted evidence gathered across the school session to discuss and learn how living things are affected and respond to changes in climate across the year.

Good Practice Example 14

In one primary school, children benefited from high-quality learning in the sciences which increased engagement and improved motivation. Staff worked together with the local science centre to plan learning in the sciences. Staff felt that they benefited from the professional learning opportunities and access to equipment, materials, ideas and support available through close partnership with the science centre. Children enjoyed the additional opportunities for hands-on science and access to equipment that they would not normally have experienced.

Good Practice Example 15

One primary school organises an annual 'science week' in the summer term. This is planned over the school session involving children, teachers, parents and external partners. The activities, visitors and guest speakers are selected by each class to complement and provide depth to their ongoing learning in the sciences. For example, children's selections have included 'Animal Man', the Royal Society for Prevention of Cruelty to Animals (RSPCA), the school nurse, dental hygienist and one of the science centres to provide workshops for them. In addition, a number of parents in science-related careers were invited to talk to children about their jobs to help raise the profile of careers in the sciences. The children evaluate each session and use this to plan the next 'science week'. Children describe being enthused by inspiring activities, workshops and access to resources that they would not routinely have access to in their everyday school life.

Good Practice Example 20 - New to this updated version of the report

One primary school has successfully planned high-quality progressive programmes of learning in the sciences through collaboration and participation in effective cluster learning rounds. Teachers from Primary 5, 6 and 7 observed science lessons in S1, S2 and S3 with a secondary colleague undertaking reciprocal visits to observe science lessons in the primary school. The focus for the partnership work was to explore how breadth, depth and challenge in learning were being addressed. Teachers were also keen to ensure that;

- children and young people were being given appropriate opportunity to apply their skills in new contexts;
- planning was taking into account learners' prior learning to avoid duplication of content; and
- planning was ensuring progression through building on prior learning.

Staff used the evidence from the learning rounds in conjunction with the relevant science documentation - Concept Development in the Sciences, Assessing Progress and Achievement in the Sciences and Sciences Principles and Practices – to create well-planned learning programmes detailing clear lines of progression across all five organisers and the other significant aspects of learning.

Teachers planning together in this way were able to gather very good evidence of how well children are progressing through the levels. This work has impacted very positively on staff motivation and confidence, pupil engagement, enjoyment and achievement.

Good Practice Example 22

Children in one primary school demonstrated high levels of motivation and interest in the sciences. A strategic plan outlining progression in developing children's skills and knowledge and understanding underpinned the learning. The headteacher used this framework to encourage staff to develop exciting, creative contexts familiar to children's experiences. Partnership opportunities were maximised. For example, a local bee keeper worked closely with the school. One group of children with barriers to learning demonstrated an in-depth knowledge of bees, their behaviour and their impact on the environment and the economy.

Good Practice Example 23

The 'Reebop Project' was used by learners in P7 to develop an understanding of genetics, variation and inherited characteristics. Working collaboratively, children applied new learning in a relevant context. The teacher adapted the resource to meet the needs of learners through planning an increased degree of challenge in the activity. Children were required to use literacy, numeracy and problem solving skills leading to deeper learning. The hands-on practical nature of the activity, with learners building a model of their Reebop, and the level of

discussion as children worked together to respond to the challenge, resulted in them being able to access a conceptually difficult area of the sciences.

Good Practice Example 25

One primary school engaged children very well with their local environment through partnership with the Galloway Fisheries Trust in the 'Clyde in the Classroom' project. Children reared trout fry in a classroom hatchery before releasing them into the local river. Children's knowledge of lifecycles and the basic needs of living things were developed as they cared for the trout fry. Working on the project provided a context for developing numeracy and literacy skills, for example through creative writing tasks and activities such as estimating and measuring the length of the developing fry. It also helped the children to understand the geography of their local river network and provided a relevant context for learning about the effect of our actions on an ecosystem.

Good Practice Example 35

Children in one primary school benefit from the active role their parents take in contributing to their learning. Children and their parents across all stages in the school complete highly motivating science challenges at home. The challenges are planned, progressive and involve children applying their learning in a new context. They relate to real-life contexts and link coherently to the very well planned approach to developing children's skills, knowledge and understanding in the sciences. Challenges are open-ended with clearly defined success criteria for assessment. Challenges are assessed using a range of approaches. For example, a child made a model and shared what he learned with his peers. Another child used video clips in a presentation to demonstrate her learning. Parents felt supporting their children with the science challenges kept them well-informed about their child's progress in science as they move from nursery through to primary 7.

Secondary schools

Good Practice Example 3

The Go4Set challenge has been used by a number of schools, sometimes in conjunction with the CREST Award scheme, to recognise achievement in sciences. One school reported an impact on young people's development of enterprising attitudes in the context of sustainable development, as a result of participation in the challenge and the opportunity to work alongside industrial mentors.

Good Practice Example 7

A secondary school used a whole school approach to developing young people's numeracy skills. A numeracy working group agreed the way that aspects of numeracy would be approached across the school. Approaches were summarised in a helpful 'Pupil Numeracy Guide' that young people used for support across their subjects. For example, 'The story of graphs' approach was used to aid learners in interpreting data presented graphically in the sciences. Copies of the numeracy guide were issued to parents to enable them to support their children's learning.

Good Practice Example 8

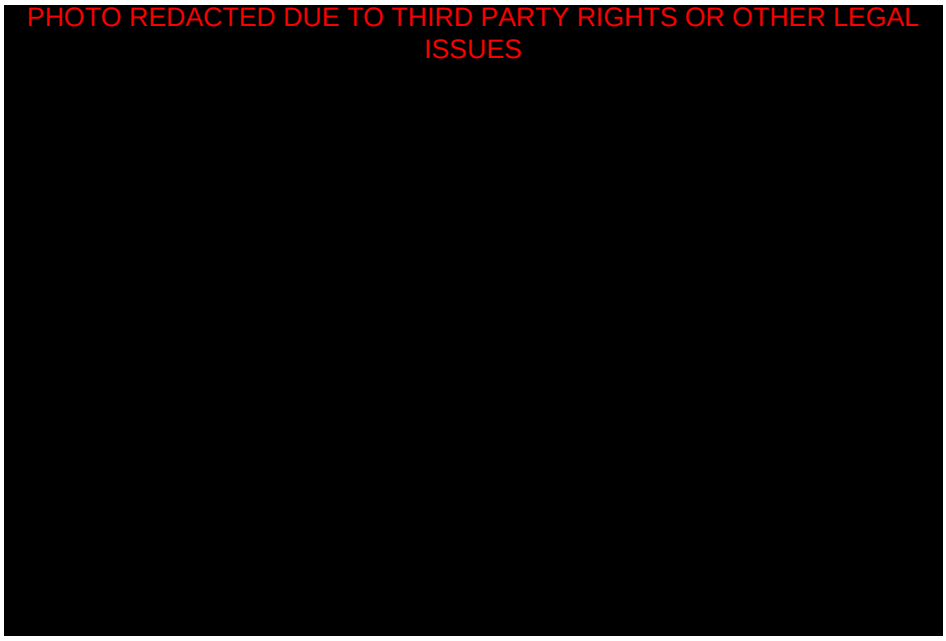
One secondary school provides support and education for young people with autistic spectrum disorders mainly in an Enhanced Provision Unit within the school. The unit aims to help young people access the curriculum as independently as possible. Some young people's needs are met through a high proportion of their learning being within mainstream classes with independence. Others can access some classes with individualised support, whilst young people with more complex needs access very few mainstream classes and learn in the unit for a higher proportion of their time. When learning in the unit, a member of staff will interpret any crucial concepts that the learner finds difficult to understand and consolidate what has been learned in class. This is usually done by making the information more visual through use of the internet or interactive whiteboards, through staff-developed visuals, or by finding relevant real-life examples to help facilitate understanding. Sciences staff provide effective support to unit staff in the development of individualised learning programmes. Through successful approaches to meeting young people's needs a few young people learning in the unit have successfully achieved Standard Grade and Access sciences awards and units.

Good Practice Example 9

One secondary school provides support for young people with complex needs in a learning base within the school. They experience their learning in the sciences in mixed stages mainly within the base. Shared experiences with those in the mainstream school supports their learning, such as activities related to the school's 'Managing an Environment Area'. The base works very closely with external partners from recycling and forestry projects to involve young people in team working and enterprise activities. A local dietician has supported the health and wellbeing programme with links to science work. There has been measurable positive impact on a few young people's health and wellbeing. Sciences staff effectively support the sciences provision through supporting the development of learning programmes and securing appropriate resources. Close partnership working has enabled young people educated within the base to achieve qualifications.

Good Practice Example 10

A partnership between the English and sciences departments in one school strengthened learning through topical debates in the sciences. Staff reported greater understanding of assessment criteria and approaches to appropriate assessment of learners' participation in and contribution to topical debate. Young people found that they were more able to connect their learning in English to learning in the sciences, and to express their understanding of aspects of the sciences using debate. Researching new contexts to contribute fully to debates, with clear understanding of criteria for assessment, has led to deeper learning for young people.



Good Practice Example 11 – New to this updated version of the report

An innovative approach to learning in S3 has been developed by one school. Although led by a teacher in the sciences, health and food technology, English, religious, moral and philosophical studies (RMPS) and modern studies teachers collaborated in the planning of interdisciplinary learning. A "Lost" theme was chosen as a context for learning. Young people found the storyline approach to their learning stimulating. The story was developed first in biology with other departments using the context for learning at appropriate points throughout the session. Teachers planned together before the project began with a clear outcomes for young people being identified. Teachers' planning focused on subject-specific experiences and outcomes at fourth level, the development of young people's literacy, numeracy and health and wellbeing and a range of skills. Across the year young people could engage with the characters in the story through a blog-style approach hosted on the school website. Young people debated ethical and moral issues in RMPS and modern studies in topics that they had suggested. They regularly evaluated their own and others' listening and talking skills through debate. There were significant opportunities for creativity, applying learning in unfamiliar contexts, and communicating understanding through a range of media. Young people evaluated the project. They enjoyed the project, felt motivated, found that they could see links in their learning across subjects, felt that their learning was relevant and found that their confidence in presenting to others was developed. The school has used young people's views to make changes to the project. Teachers have found that there needs to be a more explicit focus on dialogue with young people to make it more explicit the skills that they are developing. Young people's language of skills development needed developed better. This has informed the planning for the next interdisciplinary project.

Good Practice Example 18

Learners in one secondary school took up a 'Sciences Solutions' challenge. Young people worked in pairs, each of whom were given a challenging task briefing at the beginning of a four week learning block. Challenges were differentiated and open-ended to meet a range of needs. As the block progressed, young people were responsible for managing their own learning, preparing a learning log to ensure that they had gathered all of the learning required to successfully complete the challenge task. Young people felt they had opportunities to be creative, working together to design a solution. They reported high levels of motivation and interest, and felt they were able to work independently to extend the original challenge. As part of the assessment, learners were videoed explaining their challenge solution and the underpinning science. This work was presented to parents and at a transition evening.

Good Practice Example 24 - New to this updated version of the report

One secondary school has successfully used QR Coding to make homework more accessible for young people and enhance opportunities for deeper learning. Each homework exercise which is issued in written format has an allocated QR Code. Young people can easily use QR readers on their mobile phones or other mobile devices to access homework prompts if they experience difficulty or access resources which can allow them to study each topic in greater depth. Young people without access to computers or laptops with internet connection have found the use of mobile devices a valuable way of engaging in learning outside the classroom.

Good Practice Example 27

In one secondary school, an S1-S3 integrated science course offers opportunities for exciting, relevant and topical contexts for learners. The sciences staff have worked together to prepare well planned and innovative topics, for example ‘Scrubs’ and ‘Who Wants to be a Scientist?’, through which young people experience learning which integrates experiences and outcomes traditionally approached with biology, chemistry and physics topics. Where appropriate to their needs, young people have the opportunity to experience learning at fourth level within these integrated topics, to challenge and extend their understanding.

Good Practice Example 32 - New to this updated version of the report

Discovering an invasive species of worm within their school grounds and sharing the news with the scientific community was just one of many exciting moments for children turned citizen scientists at one primary school. Through their citizen science activities, children developed a range of scientific skills including measuring accurately, recording, classifying and observing. Information and communications technology (ICT) and literacy skills were also developed in the process of uploading data to the OPAL website and recording experiences and learning in their John Muir Award journal. Partnerships with local conservation groups and a university enabled detailed study of the biodiversity and impact of climate change on the local river. Children reported an increased enthusiasm for science and a new-found pride in their local community and its natural assets. Children who required additional support with their learning were fully included in all activities and had grown in confidence as a result. Find out more about Citizen Science surveys.

Good Practice Example 34

Young people at S2 discussed learning outcomes and agreed success criteria with each other and their teacher for a piece of practical work prior to them carrying out their investigative work in groups. Using mini video cameras and their ICT skills each group filmed another group carrying out their investigation. On completion, they watched the films, analysed their own and each others' practical techniques and evaluated achievement against the learning outcomes and success criteria. Next steps in learning were identified for individual learners.

Good Practice Example 36

Young people in a senior phase sciences class worked in pairs to research one aspect of a topic and write and record a podcast for classmates. They each put all of the podcasts on their MP3 players or mobile phones to use for learning and later revision. Young people reported feeling a sense of responsibility to ensure their work was of high quality, clearly explained and submitted on time to benefit others. They approached the task by first discussing and considering the Revised Bloom's Taxonomy (2010). This provided them with a framework to plan the task through identification of the required learning and thinking skills. For example: Remember - find the information; Understand – convey the information in their own words; Apply – apply the information they have gathered to the specific context with which they were working; Evaluation – evaluate the sources for reliability and quality; Analysis – select the most appropriate information for inclusion; and Create – bring the various information together in their own words, in an appropriate order, communicating clearly to help others' learning. Staff noted increased pupil engagement, not only when preparing, creating and generating their own podcast but also when listening to others' podcasts. Learners felt they understood more about using their thinking and learning skills to learn from others' work, and that they had benefited from taking responsibility for their learning.

The young people used self and peer-assessment based on the Revised Bloom's Taxonomy throughout their learning in this subject and described feeling that they had a much better understanding of their learning and how to achieve success in the sciences. The approach was then used with other classes. This good practice was also shared with other teachers, building capacity to enable them to use it with their classes.

Good Practice Example 39

One sciences department identified through their self-evaluation a need to develop further the leadership skills of senior pupils and raise the profile of pupil voice. A group of senior pupils studying sciences at Higher, Advanced Higher and for the Scottish Baccalaureate in Science held a regular lunchtime 'science pupil forum'. Young people across various stages dropped into lunchtime sessions to make suggestions for improvements and provide feedback on learning programmes within the broad general education and the senior phase. A science pupil forum noticeboard was maintained regularly by young people keeping others abreast of discussions and impact of their work.

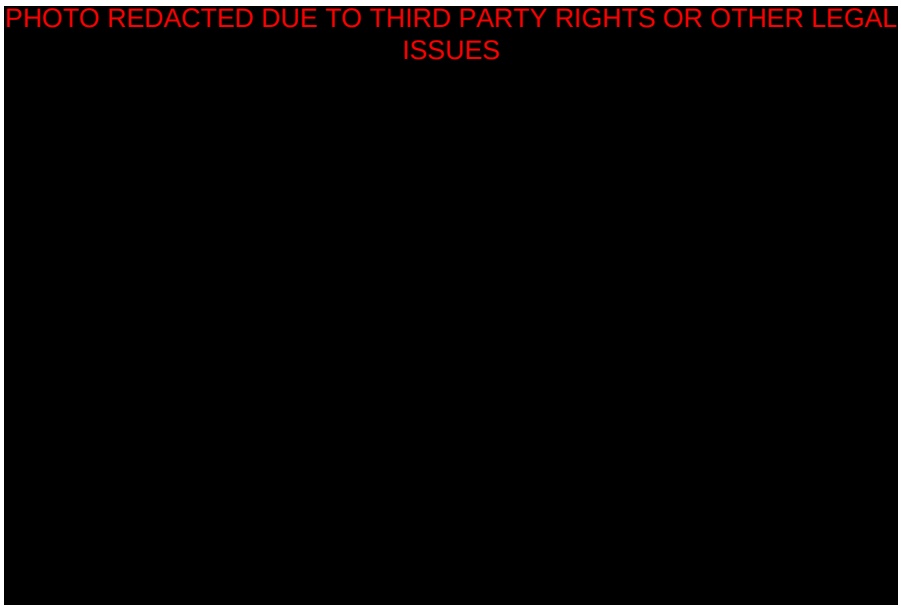
Education authorities

Good Practice Example 33

Children and young people in three education authorities worked collaboratively to achieve deep learning in the sciences, using learning materials developed by initial teacher educators and funded by an external trust. Learners reported high levels of motivation and enjoyment, engaging with practical investigative work to solve a challenge, over about six lessons. Collaboration and sharing findings took place using Glow Wikis and Glow Meets. Children and young people responded very positively to this approach and developed their ICT skills. Staff noted the extent to which learners were writing independently on the Glow Wikis to discuss findings, and express conclusions drawn from the available evidence. Evaluation indicated children and young people benefited from participation in the learning. The education authorities involved are sharing this good practice and extending the work further.

Good Practice Example 37 - New to this updated version of the report

The ambition to secure positive destinations for all young people and stimulate economic regeneration resulted in one education authority developing a strategic action plan for the sciences, technologies, engineering and maths (STEM) education. A successful partnership with the local further education college was pivotal. Over £1,000,000 was secured from business sponsorship and enterprise programmes in schools which helped purchase key equipment to support learning and teaching in STEM. A further partnership with a local engineering and housing development provided further context for learning. The authority is rolling out the Primary Engineer programme to all primary schools and is making effective use of the STEM ambassador programme to build the capacity of schools. Further funding has been secured from local businesses to employ a pan-authority STEM Coordinator to take forward a 3 year early childhood to S1 STEM programme.



Good Practice Example 40 - New to this updated version of the report

A cluster of sixteen schools worked collaboratively over a three year period to develop learning and teaching in the sciences. The aim of their partnership working was to support primary/secondary transition; provide a progressive, cohesive sciences experience for all children and young people; and build staff confidence in teaching the sciences. A teacher from the associated secondary school and one from each of the primary schools were allocated time to work together to produce a progressive sciences programme. They used Education Scotland's STEM Central contexts as the basis for planning progressive learning. The planning took account of skills development and opportunities for assessment across the significant aspects of learning in the sciences. The suggested contexts provided an approach (using engage, explore, explain, elaborate and evaluate) for staff to work collaboratively and flexibility for teachers to develop their own learning narratives. Working together, teachers produced a number of suggested rich tasks outlining progression from early to third level, a skills progression framework, a sciences glossary and a helpful teachers' guide. Practitioners from across the cluster were provided with an opportunity to engage with the new resources at an all-staff cluster engagement event and have begun to use them in planning learning. Teachers felt that as a result of this partnership working, they better understood the standards for learning in the sciences and felt they would be more confident than they would otherwise have been in working with other colleagues to share developments. The cluster schools will continue to collaborate to extend the approach they have developed to incorporate technologies, engineering and mathematics as well as sciences. This cluster approach will now be disseminated to other schools in the education authority.

Good Practice Example 42 - New to this updated version of the report

A series of inspection reports highlighting weaknesses in sciences provision prompted one education authority to make the sciences an improvement priority for its schools. Science was included in the authority's performance framework which in turn encouraged schools to incorporate it as a priority within their improvement plans. This raised accountability for sciences at school level. It organised sciences professional learning for teachers, some of which took place over a week long period in the summer break period. This has been offered in partnership with the local science centre and a variety of visiting speakers have provided an array of high-quality presentations and workshops to support teachers in developing their confidence, knowledge and skills. These programmes of activities have been well attended and evaluated positively by teachers. They have reported increased levels in confidence in teaching the sciences. A number of schools in the education authority have participated in the Primary Science Quality Mark project.

The education authority has reported significant progress in the sciences across primary schools over the three year period. The achievements and progress of schools were celebrated through high-profile showcase events.

Partnership working

Good Practice Example 2

Some schools have made use of the Youth Scotland partnership with Eco-Schools Scotland. This has allowed learners to gain individual recognition and accreditation for their learning through involvement in the Eco-Schools Scotland programme, using external moderation by Youth Scotland and accreditation by the Awards Scheme Development and Accreditation Network (ASDAN).

For further information on youth awards in Scotland, access Amazing Things (Third Edition)

Good Practice Example 5

A writing frame was developed and adopted by primary and secondary staff from across all curriculum areas and from within a cluster. Children and young people use this writing frame to help them to structure their functional and creative writing in all of their subjects. The writing frame is displayed prominently in all learning areas and referenced consistently by staff across the schools. Children and young people found this helped them to understand how to develop and apply literacy skills in different contexts, including writing to communicate understanding and appropriate presentation of scientific findings and reports.

Good Practice Example 6

Non-promoted staff from five different primary schools and their associated secondary school formed an effective partnership to improve children's literacy skills in the sciences. They met regularly, undertook reciprocal visits to observe learning and teaching, moderated children's work and reviewed plans. Working collaboratively they successfully developed a coherent and progressive approach with measureable positive impact on children's literacy skills. Expectations of children's capabilities in both sectors has increased. Children now achieve much higher standards in report writing with notable improvements in their use of scientific terminology and vocabulary. Children write independently and use higher order thinking better when forming conclusions and evaluations of investigations.

Good Practice Example 12

A number of schools are working in partnership with colleges and universities to enrich learning for young people studying for the Scottish Baccalaureate in Science. This allows opportunity for young people to pursue interdisciplinary project work based in their interests. Young people report high levels of motivation associated with the Scottish Baccalaureate and feel better prepared for transitions to sustainable positive destinations as a result. They enjoy opportunities to work in the college environment, and to work with young people from

other schools, and benefit from independent responsibility for their learning and achievement.

Good Practice Example 13 - New to this updated version of the report

In framing learning within an earth sciences context, one school made use of the GeoBus programme run by St Andrew's University. Young people studying physics and geography were introduced to specialist equipment including infrared cameras, accelerometers and also radar scanners which are used to map the formation of lava domes prior to volcanic eruptions. This set the learning in a vocational context with young people being more aware of possible future careers. The school visit included a capacity-building field trip for school practitioners to identify local geological features which could be used to support future field studies activities organised by the school.

Good Practice Example 16

One school has been given a substantial area of land by a local business to maintain, develop and use as an 'outdoor classroom'. This provides a relevant context for learning. Teachers can take classes to this outdoor area and develop young people's knowledge and skills as they study areas of the sciences such as biodiversity and sustainability. Young people's skills are developing through using sampling techniques, making various measurements, recording, presenting and analysing data. They develop team working skills as they contribute ideas for improving the land and work together to carry out practical work such as planting trees.

Good Practice Example 21 - New to this updated version of the report

Successful partnership working between primary schools and their associated secondary school has raised the profile of the sciences and improved continuity in learning for learners in moving from P7 into S1. Children at P7 have become more engaged with the sciences as a result of the implementation of stimulating sciences learning programmes. This has been achieved through effective collaborative planning with staff across the cluster. Children have developed further enthusiasm for the sciences through attending a secondary school science club and participating in a creative transition project. Set within the context of the Commonwealth Games children researched DNA, applied their learning in making DNA necklaces and explored the genetic profile of athletes through electrophoresis. This work has been moderated by staff from primary and secondary working collaboratively. This together with assessment evidence in the sciences and information in the P7 profiles, has been used to determine each child's achievement in the sciences and is used to form a valuable personalised transition document. This comprehensive document has been used by secondary staff to plan learning for those entering S1 which ensures young people progress across all significant aspects of learning in the sciences.

Good Practice Example 26

Traffic police worked with young people in secondary schools with the aim of promoting road safety. They worked with young people within the broad general education and in the senior phase on areas of learning such as the relationship between speed, distance and time, and momentum. Young people were shown how quadratic equations are used in accident investigations and that understanding of physics is a crucial element of accident analysis. Through this work, young people were given the opportunity to use and develop their numeracy skills in a real-life context.

Good Practice Example 28

One school has formed a positive partnership with the staff of a local country estate. Young people studying the sciences can visit the estate and experience their learning in a real-life context. They can work with the estate mangers, rangers and other estate workers as they observe what they have been their learning in practice. For example, the learning for one physics class was contextualised as they observed electricity and circuits being used for electric fences and cattle management, incorporating opportunities to consider potential hazards and risk management.

Good Practice Example 29

In one secondary school, staff from a local pharmaceutical company supported young people at S5 as they completed one of their prescribed practical activities for their Higher chemistry course. The pharmaceutical staff supported young people in developing the necessary practical skills and knowledge of up-to-date equipment. Young people could understand their learning in relation to a commercially relevant environment.

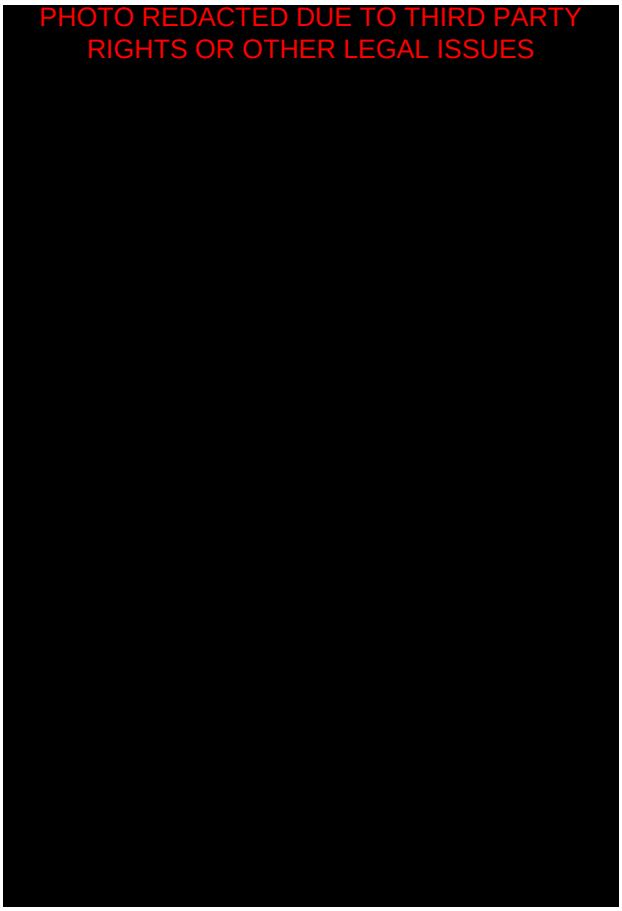
Good Practice Example 41 - New to this updated version of the report

One of the national science centres working in partnership with Mills Observatory provided professional learning and networking opportunities for teachers in the primary and secondary sectors along with student teachers. Using funding from the Association of Science and Discovery Centres and Science and Technology Facilities Council, and linking with the STEM Ambassadors scheme, practitioners had opportunities to consider how to work with partners in a meaningful way to plan rich learning and teaching for children and young people. With a focus on learning opportunities associated with World Space Week, practitioners considered issues relating to published work including the Sciences 3-18 Curriculum Area Impact Project report, Assessing Progress and Achievement of Levels in the Broad General Education (Sciences) and Primary Science Process and Concept Exploration research to consider approaches to learning and teaching science inquiry for first and second level. Delegates explored a range of practical activities developing skills, including literacy and numeracy, and are able to use learning journeys along with a ‘loan box’ of

equipment with learners in the classroom. This partnership approach also offers opportunities to plan visits to the Science Centre and Mills Observatory as part of planned learning and teaching to participate in relevant workshops and activities.

Good Practice Example 43 - New to this updated version of the report

A group of practitioners from a rural cluster participated in the first year of the Primary Cluster Programme in Science and Technology which is being piloted by the Scottish Schools Education Research Centre (SSERC). SSERC has been able to provide ongoing support for the cluster through effective interactive use of Glow using the Glow Meet facility. This has helped to overcome distance as a barrier and has also enabled a large number of teachers from all the schools involved to access the experiential professional learning being offered by SSERC. SSERC also offers interactive Glow Meets on a variety of topics which are open to all primary practitioners. Prior to each Glow Meet, the school receives a box of resources containing materials that will be used in activities to be carried out during the Glow Meet. Up to 20 schools can participate in each Glow Meet, with several practitioners attending per school. Participating practitioners work through the activities that support learning and teaching in the sciences in real time along with the SSERC Glow Meet tutor, before using them in the classroom.



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