Barrow Engineering Project

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Acknowledgements
We would like to thank BEP school and college co-ordinators for their feedback and willingness to talk with such enthusiasm about the different aspects of the BEP, also to those primary schools who allowed us to come and observe the CPD provided by Steve Smyth. We recognise time is always in short supply, as one of our industry interviewees noted, schools are time hungry, so we appreciate the time given. Thanks to Steve Smyth for his welcome to CPD sessions and other providers who allowed us to observe and then shared their views. Finally, we would like to thank Lynda Mann and Brian Wood for their practical support in providing information, assistance and guidance and throughout this fourth year of the project. Documentary evidence collected by Brian Wood in particular has been a useful source of on-going developments.
Executive Summary

Background

The BEP started in autumn 2008 and is the first of the ‘Local Engineering projects’ based on the Royal Academy of Engineering’s (RAEng) successful ‘London Engineering Project’ (LEP). This is the third evaluation report undertaken by the Researching Equity, Access and Participation (REAP) team and focuses on evaluating:

- the effectiveness and impact of key features of the BEP Primary network;
- the impact and initial developments associated with the FESP and its potential role in longer term STEM initiatives within the Barrow area;
- the contribution and relationship of the BEP Primary Network and FESP on the original BEP Network (described in this report as the BEP Secondary Network).

The evaluation draws on observations of primary Continuing Professional Development (CPD) sessions, STEM activity, 26 face-to-face and telephone interviews, and a wide range of documentary evidence including feedback from teachers and industry on FESP visits and activities organised as part of the National Science and Engineering Week (NSEW).

The report findings are divided into three sections that cover the BEP Primary Network, the Furness Education and Skills Partnership (FESP) and the broader BEP Secondary Network that discusses cross cutting issues of links with other initiatives, use of STEM Ambassadors, curriculum enhancement and involvement of families. The overview for each section and recommendations constitute the executive summary.

BEP Primary Network

The primary network was effective at bringing schools together to collaborate; there are signs of closer working relationships emerging between primary schools. Further consideration of the expectations for primary – secondary interaction is required. Networking was enhanced by contacts with the wider elements of the BEP, notably existing links with BEP secondary schools and involvement in FESP. Co-ordination was vital and is a core consideration when planning for the future. It would be useful to explore views about different network models and how these might be resourced and sustained in the future.

REAP (Researching Equity, Access and Participation) is a research and development group based in Lancaster University’s Department of Educational Research.

An alternative summary of the report was presented in an interim report.
<table>
<thead>
<tr>
<th>Strand</th>
<th>Impact and effectiveness</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD</td>
<td>Considerable benefits for individuals, schools and wider network. High quality and value for money.</td>
<td>Yes – increased confidence</td>
</tr>
<tr>
<td>STEM clubs</td>
<td>Increased number of clubs, pupil participation including gender balance.</td>
<td>Yes plans to continue 2012-13.</td>
</tr>
<tr>
<td>STEM activities</td>
<td>Increased provision and signs of embedding within the curriculum and cross-curricular links. Good balance of activities centrally co-ordinated or chosen by school.</td>
<td>Resources and details of suppliers will help support future delivery.</td>
</tr>
<tr>
<td>Networking</td>
<td>Multiple networks enriched opportunities for collaboration between primary schools, and with secondary, post 16 and industry.</td>
<td>Dependent on co-ordinator, smaller networks or collaboration may be more viable.</td>
</tr>
</tbody>
</table>

**Furness Education and Skills Partnership (FESP)**

This section provides a summary of the background and origins of FESP and has reviewed activities and progress in the first year with FESP members. FESP has operated as an effective network, bringing primary, secondary and post 16 education sectors and local industry together to: build working relationships between education and industry; raise awareness about the world of work and current educational provision; provide real world examples to enhance the existing curriculum and develop activities focused on the work of individual employers. Aspects of FESP activity evaluated include: networking opportunities and co-ordination, a series of industry visits, creation of cluster groups and development of a locally agreed list of transferable skills.

The first year provides a good foundation on which to build. In the next year FESP needs to consider: longer term co-ordination of the network, including induction and involvement of new industries; how cluster activities will be mapped for progression and disseminated to wider group of schools; and ways of developing a common understanding of locally agreed skills.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Impact and effectiveness</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking and co-ordination</td>
<td>Very effective and noted as an ideal opportunity for educationalists and industrialists to meet. Clear rationale and purposeful co-</td>
<td>Collaboration with external partners and between schools a necessary foundation, issues of co-ordination will need addressing in</td>
</tr>
<tr>
<td><strong>Industry visits</strong></td>
<td>Overwhelming success and clear impact on individuals’ awareness of industries and educational sectors. Evidence of CPD learning and resources used within lessons</td>
<td>Future visits recommended for different staff, and to be offered by new employers. For sustainability it may be worth planning a rolling programme.</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Cluster groups</strong></td>
<td>Three out of four have plans for autumn term piloting. To date, impact on raised awareness and building working relationships. Progress has been slower than planned, due to things taking longer, however, potentially wider range of activities being developed.</td>
<td>Difficult to judge at this time. There is recognition that FESP will need to plan for progression and dissemination.</td>
</tr>
<tr>
<td><strong>Development of locally agreed transferable skills</strong></td>
<td>Unplanned, but major development arising from FESP, already effective in raising awareness. Potential impact extending beyond STEM subjects.</td>
<td>Numerous possibilities about how this agreed set of skills might be used. In year ahead FESP need to agree how the list is disseminated and used by careers teachers and in other curriculum areas.</td>
</tr>
<tr>
<td><strong>Future Developments: parental involvement</strong></td>
<td>Limited to date, but recognition of the importance of working with families to raise aspiration and awareness – a need identified across FESP, see discussion page 38</td>
<td></td>
</tr>
</tbody>
</table>

**BEP Secondary Network**

This section has included an update on secondary activity and observations about cross-cutting issues that have been mentioned earlier in the report or discussed more fully in previous evaluations. The BEP Secondary Network has continued to provide an effective network and channel of communication; it has enabled BEP co-ordinators to be briefed of developments in the BEP Primary Network and FESP. The evaluation has not measured the extent to which channels of communication within individual secondary and post 16 colleges have been developed. Nevertheless, BEP scorecards, reports on FESP visits and primary teacher interviews confirm that the number of active secondary teachers involved continues to grow.
**Overall observation of outcomes**

Overall the fourth year of the BEP has shown an increase in the number of opportunities delivered by the BEP. Figure 7, on page 42, shows number of primary and secondary opportunities. Funding for 2011-12 was intended to:

**Provide 6000 more opportunities for young people to engage with engineering 2011-13:** This target has been exceeded, with 7892 engineering opportunities engaged in by young people in 2011-12. This represents an increase of 4362 opportunities from 2010-11, and 1,892 more opportunities than the original target.

**Establish or support STEM clubs in all primary schools with a 50:50 gender participation:** This target was achieved, with examples of new clubs established and existing clubs enhanced. Clubs involve 199 (52%) males a 184 (48) females and total of 383 primary pupils.

**Creation of Furness Education Skills Partnership with support from BEP co-ordinator:** This target was achieved, with three successful industry visits hosted that raised awareness.
across the education sectors and between staff working in different companies. In addition, four FESP cluster groups have been established and have started to develop pilot activities for dissemination across the wider BEP Primary and Secondary Networks. Effective working relationships have been established that have resulted in the development of a locally agreed list of core skills that has the potential for future curriculum development.
Background

BEP Context

The 2009 *BEP Evaluation Report* (Houghton, Marsden and Davies, 2009) provides further contextual details for the introduction of the Barrow Engineering Project (BEP), though a brief outline is provided below. The BEP started in autumn 2008 and is the first of the ‘Local Engineering projects’ based on the Royal Academy of Engineering’s (RAEng) successful ‘London Engineering Project’ (LEP).

**Aims**

The overall aims for the BEP mirror the strategic priorities of the RAEng (reported in Evaluation 2009 section 1.2). The intention is that the BEP will provide tangible pathways to apprentice, technician and undergraduate learning and employment, and enhance current activities. Across the age range:

- attainment levels should improve;
- more young people will be aware of the valuable contribution engineering makes to our society;
- more young people will be motivated to take STEM related studies;
- more will gain employment in the engineering sector.

(Taken from Barrow Engineering Project Overview)

These aims are consistent with the aims of other schools, colleges, and local industry partners who are committed to improving attainment, extending educational pathways, widening participation, and creating awareness and opportunities for the young people of Barrow.

**Management and co-ordination**

Lynda Mann from the Royal Academy of Engineering manages the BEP and Brian Wood co-ordinates the project. In the academic year 2011-12, this involved providing an effective link to individual school and college BEP co-ordinators, and members of the Furness Education and Skills Partnership (FESP) (see appendix 4 for organisational membership of the BEP networks).

**Funding**

In addition to funding from the Royal Academy of Engineering, the BEP draws financial support from a number of sources. The project has been successful in securing additional funding from the Garfield Weston Foundation for 2011-13, which has allowed the existing network to expand and work with ten feeder primary schools in the Furness region.
Additional capital has also been secured from the Education Business Partnership (EBP) Legacy Fund (used to establish FESP), complement funding from individual school budgets and considerable ‘in kind’ support from the core industries involved in FESP and Cumbria STEM Centre Ltd. The Sir John Fisher Foundation will also support the BEP financially in the 2012-13 academic year.

**National context**

Successive governments, economists, employers and educationalists have stressed the importance of STEM subjects in securing Britain’s economic position in the global economy. A NFER report commissioned by the Department for Education (DFE, 2011) estimated that British engineering and science industries have an annual turnover of £257 billion, yet suggest that ‘skills shortages in these areas will threaten the UK’s capacity for growth’ (DFE, p i). Such concerns are mirrored within Barrow-in-Furness and may be exacerbated by factors such a population migration and overall low educational attainments in the area, which are discussed in more detail subsequently.

The concern of a ‘skills shortage’ in engineering and science is, furthermore, a driver behind the work of the Royal Academy of Engineering. RAEng provides the national focus for the Engineering strand of STEM developments and was instrumental in the introduction of the BEP (see Houghton, Marsden and Davies, 2009 for further details). The RAEng aim is:

> To enhance the UK’s engineering capabilities, to celebrate excellence and inspire the next generation, and to lead debate by guiding informed thinking and influencing public policy (RAEng, 2009).

**National policy changes since 2010**

Despite the Coalition government’s continued commitment to STEM, there have been changes in the national context since our 2010 Evaluation of the BEP. These include changes in government departments responsible for education and work, abolition of the QCA, ending of the Educational Maintenance Allowance for learners aged 16 to 18, and proposals impacting on the provision of careers education (Houghton et al., 2009 and Houghton and Marsden, 2010). More recent developments include:

- changes regarding school and college responsibility relating to information, advice and guidance (IAG) and careers education outlined in Section 29 of the Education Act 2011;
- The Wolf Report that reviewed vocational education and the role of apprenticeships (DFE, 2011);
- The forthcoming removal of the statutory requirement for work related learning at key stage 4 (DfE, 2012);
• The demise of Aimhigher and its role in raising awareness and aspiration of higher education.

The Barrow Context

The publication of the 2011 Census has engendered some press interest in the town of Barrow-in-Furness. According to the Census, Barrow has witnessed the largest decline in population in England and Wales, falling from 72,001 reported in the 2001 Census to 69,100 (Cumbria Intelligence Observatory, 2012). This represents an overall population decline of 4% (Nugent, 2012) which news reports put down to a decline in three of its key industries: iron, steel, and shipbuilding. For example, the Cumbria Local Economic Assessment (Peck, et al., 2010) cites that, since the 1990s, Barrow’s shipyard reduced its workforce by 8000, to the current figure of around 5,200.

In June 2012, the Office for National Statistics (ONS) data report that, 4.1% of Barrow residents of working age were claiming Job Seekers Allowance – the highest proportion within Cumbria’s six Local Authorities (Barrow Borough Council Website, 2012). When other benefits such as Incapacity Benefit and Employment Support Allowance are taken into consideration, this figure multiplies to 16.6% of the total working age population (2010 figures- Peck, et al., 2010).

Three further concerns compound this overall population migration from Barrow. The first, highlighted by ONS (2010)3, is that Barrow has witnessed the sharpest decline in Cumbria in the percentage of its population aged 15 and below – declining by 15.3% since 2001. A second concern, highlighted in responses to the Census data by Barrow Council Leader Dave Pidduck, is that of ‘young people leaving [Barrow] and not returning’ (Brown, 2012). The Barrow Engineering Project estimates that between 1991 and 2001 there was a 35% reduction of 18-30 year olds in Barrow-in-Furness (RAEng website). This may, in part, be due to a phenomenon reported by the URS Corporation (2008) of young people leaving Furness to go to university and choosing not to return after graduation.

The third issue is that educational attainment in Barrow remains below local, regional and national averages (Cumbria Local Economic Assessment). In 2009, 8.5% of Barrow residents held no qualifications and 64% of Barrow’s school-leavers achieved five GCSEs at grades A* to C, compared with a County average of 66.7% and a North West average of 70.9%. Fewer of Barrow’s A-level students achieve three ‘A’ grades (Barrow 7.1%; Cumbria 9%; North West 10.2%) though around 50% of Barrow residents hold qualifications of NVQ3 or above.

The migration of people of working age from Barrow coupled with an ageing population, the loss of skilled workers due to the reduction of its traditional industries, and the relatively

3 www.cumbriaobservatory.org.uk/elibrary/.../40946152817.doc
low levels of educational achievement may contribute to a reported ‘skills gap’ in the area. The 2010 Cumbria Business Survey (Wiseman and Parry, 2011) reported that within Cumbria, 9% of all businesses felt their employees lack the skills employers demand, though this concern was expressed by a slightly higher percentage of businesses based in Barrow and Eden (11% each).

It is within this context that the BEP operates. At a celebration event (2011), at the end of year 3 of the BEP, Stuart Godden, Engineering and Commissioning Director at BAE Systems, said:

To me, the Barrow Engineering Project is part of a community effort to stem this flow, and to enrich the attainment and skill levels of the young people involved. [the goal is] to get people interested in engineering – which, ultimately, results in keeping them living and working in the area. (Evening Mail, 2.8.11)

Similarly, this mismatch of skills or lack of awareness of opportunities amongst teachers, pupils and their families is being actively explored through FESP:

we know, or we think we know what the young people need. Through FESP it is very interesting to hear what employers need from young people when they come to consider employing them (Post 16, teacher).

See section Development of a locally agreed skills list page 30.

**Evaluation**

This is the third evaluation report undertaken by the Researching Equity, Access and Participation (REAP⁴) team and focuses on evaluating:

- the effectiveness and impact of key features of the BEP Primary network;
- the impact and initial developments associated with the FESP and its potential role in longer term STEM initiatives within the Barrow area;
- the contribution and relationship of the BEP Primary Network and FESP on the original BEP Network (described in this report as the BEP Secondary Network).

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⁴ REAP (Researching Equity, Access and Participation) is a research and development group based in Lancaster University’s Department of Educational Research.
Qualitative and Quantitative Data

Although the work of secondary schools and post 16 colleges have not been a focus for this evaluation, comment is made on the basis of data collected as part of the 2011-12 evaluation. The evaluation draws on evidence obtained from:

- 26 digitally recorded and transcribed interviews including:
  - face to face interviews with BEP co-ordinators and primary teachers in three of the ten BEP Primary network schools held in November 2011 and July 2012;
  - additional telephone interviews with members of the Furness Education and Skills Partnership (FESP);
- documentary evidence including minutes from all networks, scorecards for primary, secondary and post 16 colleges with details collated by Brian Wood (BEP co-ordinator), school and college newsletters, websites, feedback from FESP visits, materials supplied by FESP industry partners;
- face to face and telephone interviews with Brian Wood together with press releases and other documentary evidence about the project;
- observation of CPD sessions delivered by Steve Smyth and Cumbria STEM Centre Ltd., primary workshop.

The interviews were digitally recorded, transcribed and analysed by the REAP team according to the focus of the 2011-12 evaluation.

Terminology

For the purposes of reporting all school and college co-ordinators are known as BEP co-ordinators; other staff in schools including Head teachers, technicians, teachers and Connexions advisors are referred to as (primary, secondary or post 16) teachers; staff working in industry are known as providers or industry, all others are known as members of FESP.

Structure of this report

The 2009 report, offered one configuration of the multiple factors associated with the BEP project; in 2010, the report focused on a narrower set of issues, by examining three factors, (activity, schools and colleges, and the future) in greater depth. The 2012 report, covers the external, future, industry and CPD factors, expands consideration on the curriculum by exploring the introduction of a core set of transferable skills, and adding the primary factor.
Figure 1: An overview of the interconnecting cogs within BEP

The report findings are divided into three sections that cover the BEP Primary Network, the Furness Education and Skills Partnership (FESP) and the broader BEP Secondary Network that discusses cross cutting issues of links with other initiatives, use of STEM Ambassadors, curriculum enhancement and involvement of families. Each section begins with an introduction that provides a context and summary of key issues and concludes with a brief overview and table commenting on the impact, effectiveness and sustainability of individual components. The conclusion lists the recommendations and provides an overall assessment of the fourth year.
Primary Network

Introduction

The primary network consists of 10 schools, two schools being nominated by each of the five BEP secondary schools. The new schools benefiting are:

- Barrow Island Primary School,
- Burlington CE Primary School,
- George Romney Junior School,
- Holy Family Catholic Primary School,
- Low Furness CE Primary School,
- Newbarns Primary School,
- Pennington Primary School,
- South Walney Junior School,
- St Pius X Catholic Primary School,
- Victoria Junior School.

These schools vary in size and existing levels of engagement with Science, Technology Engineering and Mathematics (STEM) activities. Some had previously benefitted from BEP activities and some already had STEM related extra-curricular clubs prior to the BEP’s Primary network being set up.

Evaluation of the Primary Network has focused on the impact, effectiveness and sustainability of four strands: centrally organised continuing professional development; the establishment and on-going development of STEM clubs; STEM activities organised centrally or funded using BEP school budgets; and BEP opportunities and connections for Primary Network members.

Continuing Professional Development (CPD)

All ten schools received a Design and technology (D&T) day of CPD provided by Steve Smyth that helped to “kick start the year very effectively” and “open other teachers’ eyes to the power of D&T”. The CPD programme was centrally organised by the BEP co-ordinator which saved individual schools time and was cost effective. Talking about the overall success of the project one Primary co-ordinator said:

\[ \text{I think the success so far has been the simplicity of being able to access the funds and resources … access to CPD with Steve was very simple, we didn’t have to sort accommodation, he just turned up, it was high quality delivery and resources.} \]

(Primary, co-ordinator)
Models

The focus was different for each school as the intention was for schools to share their expertise and ideas afterwards. There were three main models of CPD delivery:

1. CPD to the teachers – not including the children, but involving all staff.

2. CPD picked up by the teachers and teaching assistants as a result of watching Steve Smyth model the activity and then a formal CPD session for teachers after school.

3. CPD picked up by the teachers and teaching assistants as a result of watching Steve Smyth model the activity followed by informal opportunities to ask questions.

The flexible approach and opportunity to select a model that fitted in with the school context was valued. For example, a school experiencing model 1 CPD confirmed that the approach was consistent with previous CPD at that school:

I think the idea was to get as many teachers involved and then they would want to do it themselves. Rather than just a few teachers watching him and then maybe the others wouldn’t want to get involved. (Primary, co-ordinator)

This shared experience and opportunity for teachers to learn together was also present in model 2, a teacher experiencing this said:

for someone like me who is not very scientific it made you realise there was lots you could cover in something like that - we had a great staff meeting where we all played round with buggies and lights, that was great [laughs]. I think until you’ve tried something yourself you don’t really know, do you? We were really excited by it; we ended up having a teachers’ race in assembly. (Primary teacher)

Observation and interviews confirmed two benefits of the embedded CPD. Firstly, teachers could experience the

Peer to peer mentors

Year 6 pupils acted as mentors for their Key Stage 1 peers. It was evident that this resulted in increased learning for all concerned. Researcher diary:

Cars powered by fans.

At one point a child had the car come towards him, this was due to the direction of the fan, this had happened by chance, and was seen as a ‘mistake’. Later Steve explained to year 6 pupils how the direction of the fan was dependent on how it was attached to the motor. He then spent some time testing this explanation out and experimenting, so he could actually see the blades moving in different directions. Next he tried to see what it did with the cars. Although there was a year 1 child watching, he largely did this in his own little bubble. However, once he worked it out, he proceeded to tell the next group what to do to make the car go forwards and backwards. He tried to show them the blade moving in different directions which didn’t seem to interest them. He then showed them on the cars saying: “watch it, if you put it this way up it comes towards you, and then if you do it the other way it goes the other way, although sometimes it doesn’t work, don’t know why”. Some of them tried it for themselves – and were obviously pleased with the results. It was noticeable that year 6 pupil grew in confidence and was able to do more after he’d done the activity a couple of times.
lesson and those who were sceptical or lacking in confidence could observe the pupils’ responses. After quickly introducing the topic, pupils supported by their teachers, teaching assistants (TAs) and in some instances year 6 pupils (see peer to peer mentors page 13), would undertake hands-on activities. Teachers, TAs and year 6 pupils were either briefed before the session or would participate in the introduction which included brief asides which contained additional explanations. During the hands-on activity time, Steve would circulate, explain in more detail the intended learning outcomes to the teachers and answer questions or offer ideas for extension activities. Further opportunities for questions were available over lunchtime or in the teacher CPD twilight session.

A second benefit of the embedded CPD was that Teaching Assistants (TAs) gained a rare opportunity to access CPD. Observations showed that some TAs had a tendency to help the pupils rather than encourage pupils to persevere and try to find their own solutions. For example, there were instances of individual TAs perpetuating gender stereotypes, missing opportunities to ask questions or extend vocabulary. It was not possible to observe subsequent lessons, but several teachers and co-ordinators spoke about the benefits for TAs who are often “only one step ahead of the pupils” and who are expected to “pick things up during the lesson”. Contractual arrangements mean TAs often miss out of twilight sessions. Several interviewees agreed with the idea that “it would be a really good way for their [TAs] CPD and the promotion of the project” and help to ensure that “TAs were confident in reinforcing the ideas”. It is recommended 1 that schools consider funding or delivering targeted CPD for TAs to complement teacher CPD (see also recommendation 2).

**Quality and effectiveness**

Observation of the sessions confirmed high quality delivery to pupils from reception through to year 6. Evaluators were in the fortunate position of observing the nuanced differences in introduction of similar activities to different age groups. These included different levels of questioning, vocabulary, and explanations of health and safety.

Schools also commented on the style of delivery as “non-threatening”, “encouraging”, and “flexible” – all qualities they appreciated. For example, one primary co-ordinator commented that:

*Steve made people feel comfortable because you are going in there and maybe it’s a subject that people are not very keen on, but the things he showed us how to do, and showed us a little bit of progression. So we had little moving cars with*
electricity, and then he added solar panels and that kind of thing, so you thought, well with my class you could do that. (Primary, co-ordinator)

There was universal support and numerous examples of the impact and benefits derived from this centrally organised CPD. These included: increased confidence; raised awareness; ideas for progression and development of DT knowledge and skills; and enjoyment as a source of teacher enthusiasm which was then conveyed to the pupils. One teacher described the change in attitudes, “it’s a sea change”. Another said the CPD had:

\textit{definitely improved the confidence and having the resources has made a difference, I’m more confident than I was, meeting Steve was good and has made a difference.} (Primary, co-ordinator)

Change, as one primary co-ordinator explained, is:

\textit{a slow process, because people tend to be, a bit, I would say, scared of DT, not wanting to get things wrong, it’s a bit like music, it can be a bit daunting.}

Returning to schools in the summer term it was evident that the style of delivery, the content and ideas for resources as well as resources left for schools had made a difference to the individual schools.

The CPD was a worthwhile and tangible stimulus to the year inspiring confidence for individual teachers and providing a basis for discussion amongst the BEP Primary Co-ordinators. Although schools shared the general ideas gained from their individualised CPD, there was limited evidence of schools sharing the detail of their activities; however, to achieve this, it is recognised that more time would have been required. It is recommended 2 that the BEP Primary Network explores if some co-ordinators would be willing to offer to deliver activities in another school, as a way of cascading the ideas and building their capacity to share with schools outside the BEP network. One approach might be for pairs of primary co-ordinators, possibly with a secondary teacher, to plan and deliver embedded CPD for TAs within their schools.

\textbf{Establishment and on-going development of STEM Clubs}

All schools have developed or extended a STEM related club. These were offered over lunchtime and after school and clearly reflected a high degree of enthusiasm from staff and students to get involved in a STEM club. A total of 383 primary pupils participated in a STEM club; this consisted of 199 males (52%) and 184 females (48%).
The clubs were described as offering pupils opportunities to engage in more open-ended investigations, and to develop problem solving skills whilst working more independently or in small groups - all these were skills that featured in the core skills list (see page 30). Three factors that appeared to influence the successful introduction, or development, of existing STEM clubs were:

- The CPD sessions, which inspired confidence, raised awareness, and offered new ideas for activities and materials.
- The Ivydale resource packs which provided a practical solution of accessing materials and equipment. Some teachers reported that assembling resources had been a hassle or a definite obstacle in the past.
- The RAEng expectation of a 50:50 gender balance that had caused schools to review their previous provision and proactively seek to engage girls.

Prior to involvement in the BEP, several of the primary schools already had an existing STEM related club. Past and present STEM clubs were typically co-ordinated by subject leaders whose confidence, experience and interests shaped the focus of the club; however, there were signs of new colleagues getting involved. Although clubs were generally offered to upper key stage 2 pupils, there were examples of new clubs started to offer younger pupils an opportunity to get involved. As one primary co-ordinator with experience of running a club explained:

> when I sent the letter out there were so many children who wanted to do it, and we only had the summer term, and I was concerned with wouldn’t be able to fit it all in, so rather than, I was going to split it into two groups and run one session and then another, but then she said “oh I’ll do it with you”, I know she wouldn’t have done it in the past, and I know she’d be happy to do it again. (Primary, Co-ordinator)

This account highlights pupils' interest, and increased staff confidence and willingness to get involved, it also suggests that at this school there were signs of longer term sustainability.

There was widespread support for information about, and funding for, pre-prepared resources from suppliers such as Ivydale. It appears that belonging to the BEP provided access to resources and materials, which teachers described as having an impact on their capacity to run an after school club:

> the main advantage of this being done centrally is the Royal Academy, they put you in touch with someone [Ivydale] who puts it [resource packs] all together ... everything is in there and all the instructions, it’s all done for you, you could literally put the pack in front of a teacher in front of a class ... I think that’s the key to encouraging more teachers and adults in schools to run these clubs ... you don’t
Encouraging girls from an early age is important to redress the current gender imbalance of girls in engineering. The majority of primary activities were offered to whole classes and thus the gender-split is dependent on the composition of the cohort. However, in the context of the STEM clubs, which were voluntary, schools, were expected to work towards a 50:50 gender balance. For the first year of the Primary Network, the gender split for STEM clubs was 52% boys to 48% girls. This is a very positive result, which is likely to reflect the proactive efforts by the schools. A sign of this shift was reported by one teacher who said:

The engineering club I'd had before had been all boys, and then I had to sit down and think, we need 50:50 here, we had to think, how are we going to attract the girls, instead of just working on wood, which was very male orientated, ... what's the best way of getting the kids involved, you ask them what they want, so we did that, ... they came up with this idea of this polytron – it’s a building kit, its mainly designed on bridges. And of course, I found, once the girls were on board, they were happy to make anything, so it was just the initial kick. (Primary teacher)

A few clubs made use of STEM Ambassadors and some had parents involved. However, overall, there is the potential to increase this type of hands on support (see section STEM Ambassadors, page 35).

There is clear evidence of the benefits of BEP investment in expanding the range of opportunities offered to pupils. It is recommended 3 that Ivydale resource packs and gender targets for STEM clubs are piloted to individual schools and those working in a locality, such as Barrow, but in a context where there is no support from a formal network. A possible development for BEP clubs would be to increase expectations for STEM Ambassador involvement and / or the involvement of parents either as an audience for products pupils have made or as ‘helpers’.

**Centrally organised and school based activity**

In all, during 2011-12, ten primary schools in the Furness area undertook a total of 65 activities that were either centrally organised or funded by the BEP. Based on Aggregate scores provided by BEP Co-ordinator (see appendix 2) there were 4457 opportunities offered either as whole school activities or targeted at specific year groups, which were supported by a total of 114 school staff.
The organisation of central activities and arrangements for individual schools to identify activities and resources for their school using the BEP budget has worked effectively. The bidding process was described as straightforward, as one Primary coordinator explained:

*I think the success so far has been the simplicity of being able to access the funds and resources; the bidding is simple, very reasonable questions that were easily ironed out.*

Within the primary schools, activities are more usually offered to whole classes. Due to the different size of schools, BEP funding was used either to fund the total cost or to subsidise the cost of activities. A standard allocation appears to have implications for how many activities the BEP funds; however, whilst there were schools who suggested a differential allocation based on size, it was acknowledged that larger schools may have more flexibility within their overall budget. Some schools confirmed subsidising activities with their own funding, “we’ve funded things ourselves as part of National Science and Engineering Week”.

**National Science and Engineering Week**

There was active involvement in National Science and Engineering Week activities. Due to the greater flexibility primary schools have over their curriculum, some chose to dedicate the whole of the week to STEM related activities, others organised whole school
involvement in the NSEW competitions. Teachers reported that the externally provided resources and challenges were stimulating and relevant for pupils across the school. Awareness of NSEW obviously increased as a result of involvement in the BEP Primary Network, and teachers talked about how they would like to build NSEW activities into their curriculum on an annual basis.

For engagement of schools outside the BEP, it is recommended that STEM Ambassadors who have links with schools might be asked to promote the scheme, or an equivalent of the Connecting Teachers scheme\(^5\) developed for primary schools. Alternatively, it may be possible for teachers funded via the Connecting Teachers initiative to send targeted information for their secondary school contacts to pass on to feeder primary schools.

**Scorecards**

The Scorecards recording schools’ BEP activities continue to provide a useful overview but are still completed in a variety of ways in each school; further development of these would aid closer evaluation and more precise judgement about the value for money of particular activities. For example, at a practical level entering data into columns would enable speedier collation (see Figure 4 below) and would show how many staff and STEM Ambassadors were supporting specific activities. Highlighting activities supported by STEM Ambassadors may help in their deployment by Cumbria STEM Centre Ltd. and make it easier for schools to discuss how the STEM Ambassadors have been used.

<table>
<thead>
<tr>
<th>Name of activity</th>
<th>Year group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Staff</th>
<th>STEM Ambassador</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of activity</td>
<td>3</td>
<td>11</td>
<td>9</td>
<td>20</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Name of activity</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>20</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 4: Example of modified Scorecard with fictional data

It is recommended that the scorecards be reviewed and modified to aid further analysis, however, they should remain simple to complete.

**BEP Networking opportunities and connections**

The BEP’s Primary Network meetings have been well attended and the idea of making clear the commitment involved in joining the network from the outset has paid dividends. There are three features of the Primary Network discussed:

\(^5\) For further information about the Royal Academy of Engineering’s Connecting Teacher Scheme see http://www.raeng.org.uk/education/connecting_teachers/default.htm
the role of the BEP co-ordinator;
- the impact and signs of sustainability arising from primary networking;
- and industry and secondary or post 16 networking opportunities relating to FESP and the BEP Secondary Network.

**BEP Co-ordinator**

In common with the sentiments expressed by the secondary BEP co-ordinators and other staff in secondary schools (see also BEP Evaluations 2009 and 2010), the importance of a central co-ordinator was identified as a core mechanism for the effectiveness of the BEP. Email communication to all staff involved was noted as an effective strategy for ensuring momentum and enabling everyone to be aware of the different strands of activity within the BEP. It also encouraged staff to discuss ideas within school and shared the work load and possible burden. One teacher described how:

> we are all talking about the latest email and innovation, and so without that approach, if it was only falling onto one person, it would be a lot of work and it might be too much. (Primary, teacher)

In addition, this shared communication has the added benefit of helping to disseminate information and gain engagement from a wider number of staff which is likely to support longer term sustainability.

Schools also spoke about the benefits of a co-ordinator to ensure things happened. Based on their experience of the BEP’s Primary network, one Primary teacher commented that:

> without a co-ordinator’s role like Brian, I don’t think it would be as successful at all; it would be a lot of work on heads, already overworked, and they have too much to do, setting up the meetings, venues and organising things alone probably it would be too much. (Primary, teacher)

The following comments highlight aspects of the current BEP co-ordinator’s approach which teachers have found helpful and which appear to contribute to effective co-ordination. Discussing Brian Wood, Primary co-ordinators said:

> he encourages you to join in at the meetings, he doesn’t put any pressure on you which is nice, and gives you chance to come back to things, he gives you deadlines, he’s very clear about what you need to do which helps.

> he is chairman par excellence, really, he gets to the point, he keeps the meeting going, he’s very punchy, and I think when he says meeting [is] an hour, the meeting is an hour … the last thing people want is a long meeting, that doesn’t achieve
anything, so when there are action points we know who is going to be actioning them. (Primary, co-ordinator)

Schools recognise that funding a co-ordinator is a challenge with respect to the sustainability of initiatives like the BEP. Nevertheless, for the Royal Academy of Engineering, other organisations seeking to fund similar projects, and BEP schools thinking about continuation of BEP networks beyond the funding of the BEP, the message is clear: a co-ordinator appears to be a worthwhile and cost effective strategy. It is recommended that ideas for how to co-fund, or share the tasks is a priority for the final year.

**Primary Networking**

Existing networks between the primary schools provided an important context for the BEP; as one primary teacher noted “Barrow is unique in that it has a strong collaborative working relationship”. The primary schools already had links with secondary schools for which they are a feeder and the Head teachers belonged to a partnership of Primary Heads. It was noticeable that following initial attendance at the BEP network meetings by the Head teacher, and as the BEP’s Primary Network evolved, Subject Leaders began to attend. The meetings provided more regular contact that was focused on discussion of STEM subjects. This gave rise to the exchange of ideas and opportunity to learn from one another, an example of this exchange was Maths in Motion (see box right). All schools appeared to have multiple staff involved in varying capacities; this seems to be increasing the networking within schools as well as between schools. Because there are a number of inter-related activities in which schools engaged, there was some evidence that members of staff within the same school are not always aware of what others were doing or how the various pieces of the jigsaw fit together. The detailed minutes and co-ordinator help, but the internal communication is something schools need to continually address. In response to a more general question about FESP, one Primary co-ordinator asked:

*Is that where you go and visit a company? I think [the head] did that, right at the beginning, I’m not really sure what happened there, it might be in my folder.*

From reviewing the scorecards, minutes and analysing the

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**Maths in Motion**

As a result of more regular contact the Primary Network provided a forum for schools to disseminate ideas and good practice.

Maths in motion was one example that provided:

- a focus for involving other teachers, “I’m not sure how it works, but the maths co-ordinator here said [they’d] be happy to oversee it”
- an opportunity to add to a School’s Improvement plan (SIP), “it could tie in with SI, we need to pick up girls, so I’m thinking of a separate club”
- inter-school competition which following a request will be supported by central funding from BEP

See resources for details
interviews, it is clear the activities are complementary and there did not seem to be issues of pupils attending repeat sessions and thus missing out on learning. However, as the number of opportunities accessed via the network increases, for instance, the introduction of FESP cluster activities (see section on FESP Cluster groups), it is worth individual schools and the BEP networks considering how to ensure schools can take advantage of the most suitable activities for their curriculum and pupils. The BEP’s Primary Network and FESP were regarded by a number of interviewees as important in ensuring time was given to enhancing existing links, expanding the number of staff involved in networking with other schools, and encouraging greater collaboration at the level of the STEM curriculum.

The delivery of the project through a co-ordinated network that involved regular task oriented meetings that encouraged schools to share ideas and work together was described as being consistent with the current government agenda of schools sharing expertise, “it’s a way of working we are getting used to and so STEM and BEP activities lend themselves equally well to this” (Primary, teacher).

Wider networking opportunities

Networking between schools within FESP clusters and networking with the secondary school who had nominated them to be involved in the BEP’s Primary Network both helped to increase the channels of communication at a more local level. Issues emerging from the wider networking include:

- complexity of networks increasing opportunities and need for clearer communication and co-ordination;
- risks associated with reliance on individuals who may become over committed;
- possibility of reaching capacity within schools that needs to be managed to minimise duplication and maximise progression;
- level of co-ordination, wider networks bringing economies of scale, greater exchange of ideas and a consistency of approach compared with smaller localised collaboration which may be easier to manage, strong enough to survive without additional assistance, but lack the equality of opportunity for all Barrow pupils.

Secondary and Post 16 collaboration

The scorecards show some secondary schools already invested time and delivered activities for feeder primary as part of the original BEP secondary funded activities. There were also existing relationships which had been enhanced by the BEP funding to secondary schools, for example, the involvement of primary schools visiting and using St Bernard’s facilities (see report 2010 for further details).
Due to the multiple networks and increasingly rich web of interaction between schools, it was difficult to confirm if there had been increased collaboration between secondary schools and their primary feeder schools as a result of establishing the primary network. The primary interviews suggest that there has been little change, “to be honest it hasn’t really changed”. For some schools the activities undertaken in the past have continued, in others, a change in staff or issues facing the secondary school have possibly resulted in less activity. However, where there had been a decline, this was regarded as temporary, and had, in effect, allowed the primary schools to focus on other aspects of the BEP project. It is possible that there is a limit to the number of additional activities in which a school can engage. Arguably, this heightens the importance of embedding activities within the curriculum and the benefits derived from a collaborative planning and development of activities, which is happening within the FESP cluster groups.

The driver of interaction between primary and secondary appears to be the secondary school. This is either through BEP secondary activities, or broader transition activities, only some of which had a STEM focus. Several primary interviews indicated that the links with secondary schools were often reliant upon individual members of staff, consequently, if the responsibilities or circumstances of their secondary contact changed, then that could influence whether an activity would be maintained:

you need someone with that enthusiasm and someone who is going to drive it, things are quite fragile and in secondary school it’s another thing you have to do. (Primary, co-ordinator)

**FESP networking opportunities**

New relationships and interaction between primary and secondary schools have been evident in the cluster groups arising from the FESP (see also discussion of FESP cluster groups page 28). This interaction has had the added benefit of enabling secondary, post 16, and industry to become more aware about how interaction with primary schools can contribute to the overall goals of the BEP and FESP. Although the following example, relates to a secondary school observation of a primary activity rather than a FESP activity it highlights the importance of working together as an aid to increased awareness:

[name of secondary school] teachers came down to take our go-cart event and they were surprised at what we had achieved because I think there is an underestimation of what 9 and 10 year olds are doing really. (Primary, teacher)

It was acknowledged by primary interviewees that awareness of how secondary schools build on what is taught in primary schools was limited. The BEP activities and in particular FESP offer a mechanism for increasing primary teachers’ awareness of secondary school STEM activity.
I think the more links we can have ... you often try and forge them but they fall down due to time, so I think the [BEP] project is the way forward for that (Primary, teacher)

**Overview**

The primary network was effective at bringing schools together to collaborate; there are signs of closer working relationships emerging between primary schools. Further consideration of the expectations for primary – secondary interaction is required. Networking was enhanced by contacts with the wider elements of the BEP, notably existing links with BEP secondary schools and involvement in FESP. Co-ordination was vital and is a core consideration when planning for the future. It would be useful to explore views about different network models and how these might be resourced and sustained in the future.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Impact and effectiveness</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD</td>
<td>Considerable benefits for individuals, schools and wider network. High quality and value for money.</td>
<td>Yes – increased confidence</td>
</tr>
<tr>
<td>STEM clubs</td>
<td>Increased number of clubs, pupil participation including gender balance.</td>
<td>Yes plans to continue 2012-13.</td>
</tr>
<tr>
<td>STEM activities</td>
<td>Increased provision and signs of embedding within the curriculum and cross-curricular links. Good balance of activities centrally co-ordinated or chosen by school.</td>
<td>Resources and details of suppliers will help support future delivery.</td>
</tr>
<tr>
<td>Networking</td>
<td>Multiple networks enriched opportunities for collaboration between primary schools, and with secondary, post 16 and industry.</td>
<td>Dependent on co-ordinator, smaller networks or collaboration may be more viable.</td>
</tr>
</tbody>
</table>
Furness Education and Skills Partnership (FESP)

Background
Following the closure of the Education Business Partnership (EBP), FESP was established in 2011 with legacy funding from the EBP and financial support for the BEP co-ordinator to take an active role on the FESP steering group. FESP builds on the existing BEP industry links and was seen by industry and education representatives as addressing a gap in the transference and application of learning from school to the workplace. Initial meetings identified a clear rationale and action plan (see appendix 3) which was consistent with the overall goals of the BEP. As one of the industry partners explained the intention was to, “try to match the school syllabus with the real company – real world examples”. The evaluation focused on four aspects of the FESP work: networking and co-ordination, the industry visits, the clusters, and the generation of a locally agreed skills list.

Networking and co-ordination
FESP has put in place a number of key structural and or procedural features including a steering group, administrative support, a clear and agreed rationale, and action plan. The credibility and professional approach, with clear actions and foci were valued by FESP members who suggested this was responsible for their own and others’ commitment to FESP and its overall success in the first year. Industry in particular commented on the “functional discussions about how business and education can work together” and appreciated that meetings were “more organised ... we already have our calendar next academic year ... so much easier for me; I get the minutes file and print them and process”.

To ensure an action focused approach, FESP membership was by invitation and was designed to provide a balance of members, with representatives from each of the educational sectors (primary, secondary, and post 16) and industry.

we recognised that if it (FESP) was too large a group then it becomes a talking shop and relatively little action, so we reduced the size of the group initially to get some more meaningful decisions and actions taken. (Post 16)

The industries involved in the first year had existing links to the BEP; consequently, there was an engineering focus, for a full list of members see appendix 4. The inclusion of primary schools is a distinctive feature and something which has been challenging perceptions about

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5 Steering Group involving Brian Wood, (the BEP co-ordinator), Caroline Vernon (Head Teacher, Victoria Primary) and Tony Gill (Cumbria STEM Centre Ltd.) whose role has been more marginal due to other commitments. Cumbria STEM Centre Ltd. continue to hold the legacy funds from the EBP.
the age at which it is appropriate to introduce links with industry. As one member of FESP explained:

*I do think a major achievement for FESP is the fact that we’ve incorporated primary, we haven’t gone for a secondary, FE focus, we’ve incorporated primary and we’ve managed to convince the businesses who we’re after that actually if you really want to achieve something in terms of raising awareness, in terms of pathways and those skills that you want to develop in young people, start in primary.*

There were also connections with Cumbria STEM Centre Ltd. who train and allocate STEM Ambassadors (see page 36), and communication channels via the BEP Co-ordinator to the Secondary and Primary Networks and other relevant groups.

One of the purposes in setting up the FESP was that it would be a network that was mutually beneficial for industry partners and all phases of the educational sector. Although FESP has been successful in raising awareness across education sectors and industry; it remains a goal FESP will need to continue to develop (see discussion about locally agreed skills lists page 30). An unexpected benefit has been the raised awareness amongst industry staff about other employers.

There was evidence from interviews with educationalists that in the past they found people working in industry would assume school was ‘like it was when they attended school’. Consequently, they reported that it was not uncommon for industry colleagues to:

*still talk about O Levels and [it’s clear] they don’t really understand the school curriculum and they don’t always understand what’s practical, realistic, achievable and attainable in terms of the kind of things you do in schools.*

Industry interviews confirmed that teachers had played a valuable role in contributing to the development of activities7, by confirming what was possible:

*“oh that would work, that wouldn’t work. Yes we can do that or we couldn’t do it when you’re saying because of this, this and this”. So it’s a kind of, it’s up to date, practical information in terms of what is and is not achievable in terms of education and business projects. (Industry)*

Interviews and a review of minutes suggests that, within FESP, raised awareness is very clearly a two way process. Educationalists across all sectors indicated that they had

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7 See also example of feedback on NSEW and development of the BAE Systems Future Engineers Day.
increased their knowledge of the world of industry. This included examples for inclusion in the curriculum of “practical mathematical application” through to appreciation of the size and scale of local employers, their global connections and the range of opportunities that might be available for their pupils in the future. In addition to raising awareness, there was recognition that within Barrow there was a need to raise pupil and family aspirations, (see involvement of families, page 38). This is one of the aims of the project itself.

**Industry visits**

Four industries (BAE Systems, Centrica, Tri-Tech, and Vattenfall) hosted successful visits for education sectors and other industries. Interviews revealed increased awareness about the individual business and numerous examples of how educators had been able to use ideas to support curriculum delivery. This included assemblies to talk about the work, stories of past pupils who were now successfully working for a local employer, and real world examples of mathematical concepts. For example:

*We were taken round by a local lad who hadn’t done very well at school, started off small and done really very well, and he was quite inspiring when we went round ... if we were blown away by seeing all that, how would the children feel seeing all that, and to feel that, perhaps, they've got a stake in that in the future if that's what they wanted.* (Primary, teacher)

*learn about the necessary skills and experience required, see first-hand the equipment used ... and then be able to relay some of these processes involved and experiences back to the children. It was also good to hear about the opportunities and different career paths now available.* (Primary, teacher)

*all of those trips are really valuable CPD for our members of staff, it gives them a real insight into local job opportunities [which] wouldn’t have naturally occurred.* (Post 16 co-ordinator)

FESP visits also reinforced and demonstrated the practical application of ideas which had been demonstrated within primary CPD, for example, links between Vattenfall wind farm and creating windmills. Industry partners also gained from visits to other companies either learning more about their work or understanding more about apprenticeships or how they already engaged with schools.

*I’ve had some fantastic trips to other businesses ... I’ve gained personally it’s been a real learning curve ... it’s great to have a good understanding of what they [other company] do, and always good to have good relations, we’re not competing and [it’s] education for us.* (Industry)
The visits provided a stimulus for ways in which companies could develop activities or disseminate some of the materials in the future. In addition, the visits began the important process of establishing working relationships and sharing common experiences on which cluster groups could build. The visits offered informal opportunities for all partners to begin to understand the working context of each educational sector and individual industries.

Visits provide an effective way of raising awareness; it is recommended that future visits including visits to new companies are planned. Where possible, opportunities to involve other members of staff should be provided to extend the number of staff gaining from this type of CPD. To extend the reach and numbers benefiting from these visits, educational attendees should explore ways of disseminating information within their school or college; this may be supported by making resources available (e.g. video or presentations), or industry representatives presenting these to a wider audience which may include parents and carers.

**Cluster Groups**

The cluster groups were designed to include members of primary, secondary, post 16 and an industry. As one secondary co-ordinator said:

*The Cluster partnership are really refreshing, [it’s] great to meet teachers from primary and tertiary ... [you get] valuable contact with primary to see what level the children are working at when they come to us, [and] see what they want to do on the industry side. As a teacher who wants to promote STEM that the children can relate to, they [industry] have a lot of resources and ideas that don’t need a lot of tweaking and not huge amounts of altering to make it a little easier.*

Each cluster operates as a mini steering group to develop ideas that would be piloted amongst cluster members and then be made available to other schools. Progress and development have varied within each cluster. Although activities are still at the development stage there is clear evidence of progress, with dates and approaches for piloting planned for the autumn term. For example:

- **Cascading between one primary and another** – the BAE project, a week-long primary project to look at the whole submarine-building process, will initially be piloted in Victoria Junior School, with peer observation by teachers from Newbarns. It will then be repeated in Newbarns.
- **Delivering a CPD session to teachers from multiple schools** – the Vattenfall project will focus on a renewable energy CPD session for KS2 and KS3 staff to be run by Owen Belsey from Dowdales, who is also operating as a Connecting Teacher.
• **Using FE media students to develop a resource for use in schools** is one of the activities being explored in the TriTech cluster, this will take advantage of technology and provide a bridge between the arts and sciences.

The final cluster involving Centrica and Walney has, to date, been more focused on activity with one secondary school and its partners.

The cluster model appears to be very effective for bringing staff together from different sectors. A wide range of lessons has been learned about the working context of other partners, this is vital for longer term collaboration. It is expected that this will help ensure that future activities are relevant, age appropriate, and increase the possibility of serving both educational and employment goals (see also development of an agreed list of skills page 30).

There are two areas the clusters will need to address in the year ahead – dissemination, and progression. Firstly, how they will disseminate the learning from the clusters to a wider group of schools, will involve agreement about how the materials will be presented. Inevitably, there is greater involvement by the representative schools and the challenge will be to explore how opportunities can become available to other BEP schools and local schools outside the BEP network.

Secondly, how clusters and FESP will avoid duplication and ensure breadth and progression within the activities that are developed. The current cluster foci appear varied, but it will be important to think about how initial activities within each cluster might be developed to be appropriate for younger or older pupils, or whether progression might be provided by clusters focusing on activities for a specific age group. It is likely that the ideal would be for progression to be developed within each cluster.

To support decisions and plans about dissemination and progression, it is **recommended** that the wider FESP network may want to consider a mapping exercise of skills associated with each activity, which would help embed their thinking and the development of a locally agreed list of core skills. In addition, they may find it useful to explore and agree some common formats for

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### What would happen?

- **What would happen if the power went fizz?**
  Nothing will keep cold in the fridge

- **What would happen if the power went out?**
  The bath water would be cold and I would shout

- **What would happen if we had no power?**
  We’d have no hot water for a nice hot shower.

- **What would happen if the power went bling?**
  The phone wouldn’t work and I need to ring.

- **What would happen if the power went down?**
  The telly would go off and I would frown.

Bobby Bone and Sophie Purdy, Year 4
Newbarns Primary School NSEW (2012) Poetry Book
capturing the activities developed by the clusters to aid their adoption and use in school.

There are already plans to expand the number of industries involved in FESP and to include employers whose focus may not be engineering, for example, National Health Service. Although the foci of other employers may not be engineering this should not automatically be viewed as diminishing the engineering focus. Instead it offers opportunities for demonstrating how STEM subjects influence the working lives of others, as one of the primary poems ‘What would happen?’ illustrates (see below). As future FESP cluster projects develop it may then be possible for engineering companies to communicate that not all their employees are engineers. From a BEP perspective, it is recommended that future FESP clusters links are made to cross cutting themes, such as the contribution of STEM and in particular engineering, it is probable that the locally agreed skills will provide one mechanism for achieving this goal.

**Development of a locally agreed skills list**

One of the tangible outcomes from the FESP network which arose from discussion during industry visits and FESP meetings was a list of 12 core skills which industry confirmed they were looking for in future employees. Though there are multiple lists existing, what is potentially important about the FESP list is that it was generated by educational staff and industry partners working together.

```
1. Self-motivation
2. Problem solving
3. Ability to work under pressure
4. Commitment
5. Interview skills
6. Reliability
7. Active listening
8. Team work
9. Ability to deal with failure
10. Time management
11. Resilience
12. Handling change
```

It is clear from the interviews that there is still room to develop an agreed understanding of what these skills ‘look like’ within the workplace. This will support how they are developed within cluster activities, other BEP funded activities, and the wider curriculum.

It is recommended that time is invested in mapping skills and identifying tangible examples within the cluster activities to aid understanding and consistent usage. One interviewee suggested that it would be useful to capture the growing awareness and
increased understanding of what these core skills ‘looked like’; this may be useful as evidence of FESP’s influence within the school curriculum.

As discussed in section 1, there is a recognised mismatch between the skills needed between employers and the skills pupils demonstrate during the application process and when they start work. In Barrow, skills gaps in high level occupations are particularly pronounced – reported by 48% of Barrow employers demanding these skills, compared with a County-wide average of 31%. This may endanger the future prosperity of the area which, despite high levels of unemployment, has seen an expansion of manufacturing and employers – like BAE Systems, Centrica, and Vattenfall demanding high level technical skills.

FESP’s current membership provides opportunities for developing a common understanding of skills and building in progression through primary, secondary and FE. An obvious area for development is the involvement of universities. Rather than providing a route out of Barrow, the BEP and FESP may offer ways of raising awareness about the possible higher level career pathways available in local employers.

**Overview**

This section provides a summary of the background and origins of FESP and has reviewed activities and progress in the first year with FESP members. FESP has operated as an effective network, bringing primary, secondary and post 16 education sectors and local industry together to: build working relationships between education and industry; raise awareness about the world of work and current educational provision; provide real world examples to enhance the existing curriculum and develop activities focused on the work of individual employers. Aspects of FESP activity evaluated include: networking opportunities and co-ordination, a series of industry visits, creation of cluster groups and development of a locally agreed list of transferable skills.

The first year provides a good foundation on which to build. In the next year FESP needs to consider: longer term co-ordination of the network, including induction and involvement of new industries; how cluster activities will be mapped for progression and disseminated to wider group of schools; and ways of developing a common understanding of locally agreed skills.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Impact and effectiveness</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking and co-ordination</td>
<td>Very effective and noted as an ideal opportunity for educationalists and industrialists to meet. Clear rationale and purposeful co-ordination</td>
<td>Collaboration with external partners and between schools a necessary foundation, issues of co-ordination will need addressing in longer term.</td>
</tr>
<tr>
<td>Strand</td>
<td>Impact and effectiveness</td>
<td>Sustainability</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Industry visits</td>
<td>Overwhelming success and clear impact on individuals’ awareness of industries and educational sectors. Evidence of CPD learning and resources used within lessons</td>
<td>Future visits recommended for different staff, and to be offered by new employers. For sustainability it may be worth planning a rolling programme.</td>
</tr>
<tr>
<td>Cluster groups</td>
<td>Three out of four have plans for autumn term piloting. To date, impact on raised awareness and building working relationships. Progress has been slower than planned, due to things taking longer, however, potentially wider range of activities being developed.</td>
<td>Difficult to judge at this time. There is recognition that FESP will need to plan for progression and dissemination.</td>
</tr>
<tr>
<td>Development of locally agreed transferable skills</td>
<td>Unplanned, but major development arising from FESP, already effective in raising awareness. Potential impact extending beyond STEM subjects.</td>
<td>Numerous possibilities about how this agreed set of skills might be used. In year ahead FESP need to agree how the list is disseminated and used by careers teachers and in other curriculum areas.</td>
</tr>
<tr>
<td>Future Developments: parental involvement</td>
<td>Limited to date, but recognition of the importance of working with families to raise aspiration and awareness – a need identified across FESP, see discussion page 38</td>
<td></td>
</tr>
</tbody>
</table>
**BEP Secondary Network**

**Introduction**

This section of the report provides a brief summary on the activity of the BEP Secondary Network including examples of events offered as part of the 2012, National Science and Engineering Week (NSEW). It also revisits cross cutting topics including: links with other initiatives, STEM Ambassadors, future developments relating to curriculum enhancement and involvement of families.

**Activity**

In all, during 2011-12, five secondary schools and the two post 16 providers (Furness College and Barrow 6th Form College) reported a total of 35 differently named activities, that translated into 53 learning events funded by BEP, some of which were centrally organised, others being organised by individual schools. In addition, four out of the five schools reported details of STEM clubs. Figure 5 provides a summary of the number of learning opportunities broken down into gender and the four main strands of activity.

![Figure 5: Bar chart of Secondary opportunities 2011-12 breakdown by gender](image)

As discussed earlier, for ease of analysis, it may be useful to amend scorecards for the final year. From the perspective of the BEP Secondary Network it is **recommended 11** that the

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8 The nomenclature used by individual schools and where they reported activities makes it difficult to confirm how many events were held. There were 35 different names used to describe activities and 53 events, the number of events is larger because some activities were offered in more than one school or repeated on other dates.
scorecards are pre-populated to include the names of centrally organised activities and, if the bidding forms provide enough detail, to include a common name for other common activities.

**National Science and Engineering Week (NSEW)**

The reputation and profile of the NSEW has grown noticeably since the start of the BEP; secondary schools showed an increased involvement and there was considerable positive feedback on the suitability of the activities provided by local companies. This reflects changes based on previous feedback and ideas for further refinement. Two of the centrally organised activities are discussed below.

**Embedding within the curriculum**

NSEW website provides resources which could be embedded into the curriculum. In the 2010 BEP evaluation, a number of recommendations referred to embedding as a key mechanism for longer sustainability. The NSEW resources and activities offer ideas that were used throughout the week; in addition, with more time resources may usefully be incorporated into the curriculum. The importance of real world examples was frequently mentioned in FESP interviews and in previous interviews with secondary teachers. To share ideas and save time, it is recommended that the BEP network or FESP clusters consider collective ways of reviewing readily available resources and stimuli such as the 30 second films ‘our world in motion’ (see appendix 1: resources) and mapping them to curriculum topics.

**Science at the Dock**

The Science at the Dock Museum event was particularly successful allowing pupils from all BEP schools access to suitable activities provided by three industries involved in FESP (BAE Systems, Vattenfall and Tritech) and Oxley. Activities included:

- **BAE Systems** – students learned about buoyancy, floating and sinking using a model submarine in a tank of water;
- **Oxley** – students experienced a view that night jet fighter pilot gets using special night vision goggles;
- **Tritech** - Remote Operated Underwater Vehicles – students watched STEM Ambassadors navigate, using Sonar, a Remote Operated Underwater Vehicle in the dock;
- **Vattenfall** – students listened to how the wind turbines off Walney were constructed and what they do, and tried out safety equipment used in the Irish Sea.
A key feature of success is building the NSEW into the school calendar; overall activities planned in advance are more likely to be well attended and avoid difficulties within school regarding lesson cover. Early planning also helps with booking STEM Ambassadors.

**BAE Systems Future Engineers Day**

Originally planned for NSEW, this was one of several successful centrally co-ordinated activities. Feedback was collated via the BEP Secondary Network, and examples were provided of how schools and industry are working more effectively together. Successful features of this event included: use of 6th Form students to act as peer mentors, tour of the BAE Systems site providing practical insight into the workplace, and an age appropriate engineering task, which had the potential to for increased involvement in testing and product evaluation. The practical suggestions offered by BEP Secondary network are transferable to other activities. For instance: keep sitting and listening time to a minimum; increase the briefing for 6th form students; and have a clear role for school / college staff which might involve them undertaking the engineering task themselves.

**Links with other initiatives**

These remain important and there were numerous examples of synergy and benefits gained by BEP and the other partners. These examples of collaboration illustrate how the BEP and individual schools or staff are building links which will support sustainability in the future. For example:

**Transition Activities**

Transition is a common concern for primary and secondary schools. As discussed, it is an important consideration for FESP cluster groups as they plan activities that provide progression, continuity and links with the core curriculum. An activity reported in the *Evening Mail* 15.07.2011, ‘*Inventive pupils take part in Go-Carting Challenge*’ is an example of collaboration between primary, secondary and FE that included:

- an exciting focus for engineering club where primary pupils built a battery powered car;
- access to secondary school resources and FE experience in delivering the activity;
- support for individual pupils with transition to secondary school;
- opportunities for informal CPD for the staff involved;
- financial support from Cumbria Karting in Barrow.

The activity has the potential to be extended and become part of an annual programme.
activities reported on Scorecards, for instance, Rotary Technology Challenge and Professional Engineers South Cumbria School Challenge\(^9\);

- Cumbria STEM Centre Ltd’s role in providing STEM Ambassadors discussed below, and
- Owen Belsey’s role and involvement in the ‘Connecting Teachers’ initiative, which provides an ideal base for disseminating some of the lessons from the BEP to a wider group of schools.

It is **recommended 13** that BEP networks discuss how working relationships will be maintained and how contact details, news of challenges etc. will continue to be disseminated in the future. For instance, FESP, Cumbria STEM Centre Ltd., Owen Belsey under the Connecting Teachers initiative, Walney Specialist Engineering College or other schools may be able to take aspects of this forward. Each option would bring its own strengths and weaknesses, and all would require resourcing, notably to provide dedicated time.

### STEM Ambassadors

As noted in previous evaluations (Houghton and Marsden 2008 and 2010) and mentioned in respect of primary activities, STEM Ambassadors make a distinctive and valuable contribution. In particular they support schools by:

- Providing positive role models whose example helps to challenge gender stereotypes;
- Sharing their educational and career journey that dispels myths and raises awareness about the different pathways;
- Raising aspiration and showing what is possible, this is particularly evident when the STEM Ambassador has been a past pupil of the school.

In 2011-12, there were 101 STEM Ambassador contributions made to BEP related activities that were arranged by Cumbria STEM Centre Ltd. This included STEM Ambassadors working in eight local companies and some retired engineers. Although individual schools reported numbers of STEM Ambassadors used on their scorecards; the relationship between the two sets of data is unclear, see recommendations 14 and 15.

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Changes in the liaison arrangements for BAE Systems’ STEM Ambassadors were welcomed and support from the BEP co-ordinator for Primary schools to access ambassadors was described as helpful and effective. For the primary schools there was evidence of a change from ad hoc usage to a more planned approach:

*we’ve used STEM ambassadors before but more for one off topics really, so we’ve had BAE Systems STEM Ambassadors to do like a science topic such as floating and sinking, but it’s always been a one off - really great, but a demo, but nothing more than that... [now] we’ve been thinking of using them to support our FESP cluster project.* (Primary, teacher)

The age, gender, area of expertise and career pathway, are all factors which influence the contribution made by an ambassador. For instance:

*we’ve had a couple of retired gentlemen who have been fantastic, they know how to deal with 9 year old children, they are looking at how they are interacting with the children.* (Primary, teacher)

STEM ambassadors also helped to promote the possibility of engineering as a career for girls and boys, one teacher said:

*the fact they [STEM Ambassador] happen to be female is great, it portrays to the children that males and females can do any job virtually.* (Primary, teacher)

The identification and allocation of STEM Ambassador is dependent on the amount of information and time given to Cumbria STEM Centre Ltd. In turn this depends on teachers’ awareness of how a STEM Ambassador could contribute to an individual activity or longer
term project. From evidence collected so far it is **recommended 14** that schools are informed about the type of information and advance notice they need to provide to ensure the right STEM ambassador is identified. To ensure that this valuable resource is used effectively it is also **recommended 15** that future evaluations might usefully examine the work of STEM Ambassadors from the perspective of the different personnel involved and trends in their deployment.

**Future developments**

**Curriculum enhancement**

The fourth year of the BEP included evidence of activities being repeated and becoming part of the school curriculum, for example, NSEW activities and challenge days. Evidence collected from primary schools confirmed that like secondary schools they are beginning to write BEP related activities into the School Development and School Improvement Plans. One primary co-ordinator confirmed that BEP activities have had a:

> really big impact in terms of helping us succeed in our school priorities and by making STEM activities and particularly this year DT giving them a higher status within the curriculum.

There were also examples of teachers having performance management targets set in respect of BEP activity. This mirrors the evidence gained from secondary schools and reported in the 2010 report (Houghton and Marsden, 2010) and complements the plans for developing activities within the FESP clusters.

Feedback collected following the FESP visits showed how a wider range of secondary and post 16 staff were able to integrate real world examples into their lessons (see previous discussion).

**Involvement of families**

During interviews with all sectors there was a growing recognition of the importance of working with and engaging families. A major reason for involving families was to raise aspiration and awareness as one member of FESP said:

> a major aspiration is to try and raise the aspiration of children whose parents may have very few themselves. And that can be done by lots of real, real world activity and application.

Many interviewees were in agreement with the view that: “the most influential place is actually the home environment” and there was general interest in enabling parents and
carers to “know how they can contribute to the success of their sons or daughters making a good employee of the future”. Although this extends beyond raising their awareness about STEM career opportunities it was clear from feedback relating to FESP that teachers were gaining insights into the skills needed and recruitment processes which were shaping their thinking about careers education. It is not surprising that some felt that greater involvement was needed to help raise parental awareness of more general work related attitudes. One industry partner outlined plans but highlighted the dilemma and perceived challenge associated with working with some families:

we’ve set a target for next year, of having open evenings for parents, the issue we’ll find is that the good students, if we can call them that, their parents will come along, but it’s the kids, perhaps slightly disengaged, and their parents are certainly disengaged, they won’t come to these events. I don’t know how we’ll overcome the problem, but you know you can inspire a kid that they want to come to these things and then their parents say it’s a waste of time, … within our demographic it’s harder to break that mentality cycle (Industry)

Parental involvement appeared to vary according to the personal circumstances, previous experiences and existing engagement in schools. Schools gave examples of parents, including members of their governing body, who worked in local engineering companies, who had been particularly supportive. In some instances, it had not been until the primary school had joined the BEP Primary network and the profile of STEM activities was raised that parents, who were STEM ambassadors, came to support engineering activities. In other schools these links already existed and had been used in the past to arrange visits to BAE.

The common examples of parental involvement mirrored secondary approaches reported previously, these included: involvement of parents in STEM clubs, or attendance at presentations by, or to, pupils participating in BEP funded activities. A specific activity involving parents, which offers the potential for further exploration, was the event for families of Vattenfall prize winners. Families were invited to attend an event to learn more about the company and the residential their sons and daughters would attend.

It is recommended that through FESP, there is further discussion and an exchange of ideas and existing ideas for engaging parents. This might usefully include teachers with other roles in school, for example, Heads of Year, careers or work experience teachers or staff and governors with responsibility for developing links with the local community.

Overview

This section has included an update on secondary activity and observations about cross-cutting issues that have been mentioned earlier in the report or discussed more fully in previous evaluations. The BEP Secondary Network has continued to provide an effective
network and channel of communication; it has enabled BEP co-ordinators to be briefed of developments in the BEP Primary Network and FESP. The evaluation has not measured the extent to which channels of communication within individual secondary and post 16 colleges have been developed. Nevertheless, BEP scorecards, reports on FESP visits and primary teacher interviews confirm that the number of active secondary teachers involved continues to grow.

Further consideration of the expectations for primary – secondary interaction is required. Networking was enhanced by contacts with the wider elements of the BEP, notably existing links with BEP secondary schools and involvement in FESP. Co-ordination was vital and is a core consideration when planning for the future. It would be useful to explore views about different network models and how these might be resourced and sustained in the future.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Impact and effectiveness</th>
<th>Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity and STEM Clubs</td>
<td>Earlier planning and regular programme of activities resulting in activities being written into school calendar. Continuation of clubs, in 4 out of 5 schools, gender balance may require a review of activities.</td>
<td>Yes – increased collaboration with external partners and between schools.</td>
</tr>
<tr>
<td>NSEW and links with industry and other initiatives</td>
<td>Positive feedback, increased participation, and signs of collaboration regarding future development of activity</td>
<td>Yes plans to continue 2012-13.</td>
</tr>
<tr>
<td>STEM Ambassadors (SA)</td>
<td>Where used SA described as a definite asset, increased use within primary sector, and active involvement in secondary. Booking supported by BEP co-ordinator, however, to ensure right SA earlier booking required</td>
<td>Good supply of SA and support from employers to release staff. Booking reliant on Cumbria STEM Centre Ltd.</td>
</tr>
<tr>
<td>Future Developments: curriculum</td>
<td>Increased range of activities, real world examples used within teaching. See earlier discussion re continuity and progression in FESP Cluster projects page 28</td>
<td>Some schools building into School Improvement and Development plans</td>
</tr>
<tr>
<td>Future Developments: parental involvement</td>
<td>Limited to date, but recognition of the importance of working with families to raise aspiration and awareness</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion and recommendations

Outcomes

Overall the fourth year of the BEP has shown an increase in the number of opportunities delivered by the BEP. Figure 7, on page 42, shows number of primary and secondary opportunities. Funding for 2011-12 was intended to:

Provide 6000 more opportunities for young people to engage with engineering 2011-13: This target has been exceeded, with 7892 engineering opportunities engaged in by young people in 2011-12. This represents an increase of 4362 opportunities from 2010-11, and 1,892 more opportunities than the original target.

Establish or support STEM clubs in all primary schools with a 50:50 gender participation: This target was achieved, with examples of new clubs established and existing clubs enhanced. Clubs involve 199 (52%) males a 184 (48) females and total of 383 primary pupils.

Creation of Furness Education Skills Partnership with support from BEP co-ordinator: This target was achieved, with three successful industry visits hosted that raised awareness across the education sectors and between staff working in different companies. In addition, four FESP cluster groups have been established and have started to develop pilot activities for dissemination across the wider BEP Primary and Secondary Networks. Effective working relationships have been established that have resulted in the development of a locally agreed list of core skills that has the potential for future curriculum development.
Progress against 2010 recommendations

The following section offers brief comments on the progress made in respect to recommendations offered in the 2010 report. Evidence has not been specifically collected for this purpose, however, the comments made offer an external observation based on the evaluation evidence collected during 2012.

1 Disseminate the new Equality and Diversity careers toolkit (DfE, 2010) and continued use of female role models (see online ‘Inspirational women’ from the WISE 2007) (p10). – evidence of female STEM ambassadors used in primary schools, suggest work continues.

2 and 3 Retain and modify the ‘scorecards’ to try and enhance the accuracy of the information collected and reduce the way they are interpreted (p13). – some improvements noted, but further suggestions recommended see 2012 recommendations 5 and 11.

4 Ask schools and colleges to indicate how they will embed the outcomes of their 2010-11 bids with their existing provision (p14). – shift in BEP secondary activities reflects greater proportion of individual budgets spent on resources that can be used in the future, in their first year BEP Primary network already recognising the importance of this approach.

5 Move bidding and planning for 2011-12 to the summer term to enable events to be recorded on school / college calendars (p14). – some evidence of earlier planning, BEP secondary network stressed the importance of confirming dates as soon as possible.

Figure 7: Bar chart showing number of activities in 2010-11 and 2011-12
6 BEP co-ordinators to discuss and agree, what, and how to use Moodle, as a source of information, and begin to explore its potential for sharing resources, and providing a forum for discussion (p14). – No evidence this was explored, need for mechanism to host and support co-ordination is still required.

7 BEP co-ordinators and other stakeholders consider how best to exchange information in the future (p15) – on-going activity, FESP with its model of having education sector representatives and cluster groups offers a potential network for the future, issues of parity and challenge of ensuring all schools have access to opportunities needs to be ensured.

8 BEP consider ways of using CPD development as an incentive for individuals and stimulus for cascading new ideas into schools and colleges (p16). – successful model used with BEP Primary Network, potential for similar approach with subject teachers of individual STEM subjects in secondary and post 16. Further opportunities need exploring for BEP co-ordinators to offer CPD for staff in other local schools.

9 Each participating school/college should reflect on the management model used to allocate BEP funding, in order to achieve the optimum use of this funding stream for long term benefit (p19). – Not evaluated this year. Similar activity of considering how BEP information and opportunities are disseminated and discussed in primary schools is required.

10 BEP considers how it might facilitate schools and colleges sharing or mapping its curriculum so that they can continue to collaborate over the focus of activities delivered in National Science and Engineering Week and inter-school / college competitions such as Greenpower (p23). Not evaluated this year, however, as noted in recommendations 8, 9, 10 and 12, the importance of providing progression and avoiding duplication also applies to FESP cluster activities.

11 BEP review the findings of the ‘Engineering the future project’ and consider approaching local universities with an explicit request to discuss longer term collaboration and curriculum development (p25). Not evaluated, however, FESP may wish to explore involvement of universities, to extend understanding and development of longer progression pathways which may be of interest to some young people.

12 BEP co-ordinators and local strategic groups give some thought about whether they will adopt a cross project approach to CREST awards or leave individual schools and activities to make unilateral decisions about the use of these awards (p26). Not evaluated this year.

13 Cumbria STEM Centre Ltd. to be invited to discuss the practicalities of rolling out a programme, including consideration of how Engineering Club or curriculum projects might be linked to CREST awards (p26). Changes in funding suggest this is no longer viable.
14 To explore ways of involving Connexions advisors and others responsible for IAG in the BEP (p29). Not evaluated this year, however, the challenge of providing impartial IAG that also addresses the needs of parents as key influencers in young people’s decision making remains. STEM related IAG is something BEP networks and FESP may wish to focus on in the year ahead.

15 To consider how careers education is delivered within schools to enable STEM IAG to become embedded into the careers education programme (p29). See response to previous recommendation

16 To support the IAG and wider careers education, the overall BEP Co-ordinator publicise relevant materials including examples from this report (p29). See response to previous recommendation and discuss the merits of STEM focused CPD for Careers Advisors in schools.

17 BEP continue to explore ways of involving STEM ambassadors in school based activities such as their Engineering Clubs (p33). Involvement of STEM ambassadors is growing, currently involvement in STEM clubs is limited; discussion in BEP networks and more forward planning by schools may help to increase involvement of STEM ambassadors

18 To retain the wider stakeholder meetings use this forum to invite stakeholders to share longer term plans (p33). Wider stakeholder meetings have not happened in 2011-12, instead replaced by FESP with BEP co-ordinator liaising with other groups.

19 To explore with the 14-19 Partnership / FEC and stakeholders the issues associated with co-ordination of joint activities and collaboration so that there is clarity for the future (p36). See comments on previous recommendation

20 For individual schools and colleges to consider ways of informing and involving parents / carers about the activities in which their sons or daughters are involved (p38). Limited progress, where activities have involved parents they appear to have been successful however, there is growing recognition and plans to prioritise the involvement of parents.

2012 Recommendations

The following list of recommendations have been identified, these build on those raised in the 2009 and 2010 reports and reflect project activity during 2011-12. Expanded descriptions of individual recommendations appear throughout the report. They are collated here and reproduced in the executive summary.
1. Schools to consider funding or delivering targeted CPD for TAs to complement teacher CPD.

2. BEP Primary Network to explore if some co-ordinators would be willing to offer to deliver activities in another school, as a way of cascading the ideas and building their capacity to share with schools outside the BEP network.

3. To pilot use of CPD, Ivydale resource packs and gender targets for STEM clubs with individual schools and those working in a locality, such as Barrow, but in a context where there is no support from a formal network. In STEM Clubs increase expectations for STEM Ambassador involvement and/or the involvement of parents either as an audience for products pupils have made or as 'helpers'.

4. To use STEM Ambassadors or Connecting Teachers\(^{10}\) who have links with schools to promote the NSEW scheme, and consider developing an equivalent of the Connecting Teachers scheme for primary schools.

5. To review scorecards and modify to aid further analysis, however, it is important that they should remain simple to complete.

6. To explore ideas for how to co-fund, or share co-ordination tasks is a priority for the final year.

7. To include visits to existing and new companies. Where possible, to involve other members of staff to extend the number of staff gaining from this type of CPD.

8. To consider a mapping exercise of skills associated with cluster activities to aid dissemination, progression and the embedding of locally agreed list of core skills. To explore and agree some common formats for capturing the activities developed by the clusters to aid their adoption and use in school.

9. To link cross cutting themes, such as the contribution of STEM and in particular engineering, to FESP cluster activities.

10. To invest time in mapping skills and identifying tangible examples of skills to aid understanding and consistent usage. Consider measuring awareness and understanding of core skills as an indicator of FESP’s influence over time.

11. To ensure that the secondary scorecards are pre-populated to include the names of centrally organised activities and, if the bidding forms provide enough detail, to include a common name for other common activities.

12. The BEP network and/or FESP clusters to consider collective ways of reviewing readily available resources and stimuli such as the 30 second films ‘our world in motion’ (see appendix 1: resources) and mapping them to curriculum topics.

\(^{10}\) For further information about the Royal Academy of Engineering’s Connecting Teacher Scheme see http://www.raeng.org.uk/education/connecting_teachers/default.htm
13. All BEP networks to discuss how working relationships will be maintained and how contact details, news of challenges etc. will continue to be disseminated in the longer term.

14. To inform schools about the type of information and advance notice that they need to provide to ensure the right STEM ambassador is identified.

15. To consider future examination of the work of STEM Ambassadors from the perspective of the different personnel involved and trends in their deployment.

16. FESP members to discuss and exchange ideas for engaging parents.
References


Evening Mail, ‘Celebration Showcase’, 2.8.2011 available at, [http://www.nwemail.co.uk](http://www.nwemail.co.uk)

Evening Mail, ‘Engineering plan for Primary Schools’ 18.10.2011 source, [http://www.nwemail.co.uk](http://www.nwemail.co.uk)


Royal Academy of Engineering (2012), Barrow Engineering Project: Programme Overview, Royal Academy of Engineering website, source: [http://raeng.org.uk/education/nep/student_questionnaire.htm](http://raeng.org.uk/education/nep/student_questionnaire.htm)
URS (2008), Talented Minds: In Furness and West Cumbria Nurturing & Attracting the highly skilled to live work and enjoy Furness and West Cumbria, Barrow-in-Furness, West Lakes Renaissance.


Appendices

Appendix 1 Resources

The following resources have been identified by interviewees and links are provided for information.

- **Greenpower**: [http://www.greenpower.co.uk/racing/goblins/teachers](http://www.greenpower.co.uk/racing/goblins/teachers)

- **Jaguar Maths in Motion Challenge**: [http://www.mathschallenge.co.uk/](http://www.mathschallenge.co.uk/)

- **Rocket Mice**: [http://www.sciencemuseum.org.uk/launchpadeducators](http://www.sciencemuseum.org.uk/launchpadeducators)
  - Key Stage 1 resource from the Science Museum where there are other resource activities for Key Stages 1 – 4

- **National Science and Engineering Week**: [www.britishscienceassociation.org/nsew](http://www.britishscienceassociation.org/nsew)
  - A website with resources and ideas linked to NSEW 2012 see recommendation 12

- **Connecting Teachers**: [www.raeng.org.uk/education/connecting_teachers/default.htm](http://www.raeng.org.uk/education/connecting_teachers/default.htm)

- **UKRC/WISE Inspirational Women**: [www.theukrc.org/wise/for-girls/inspirational-women](http://www.theukrc.org/wise/for-girls/inspirational-women)
Appendix 2: BEP Primary, Secondary and FE Aggregate Scorecard

*Year 4: September 2011 to July 2012*

<table>
<thead>
<tr>
<th>Details of Activity</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary STEM Challenge Days</td>
<td>108</td>
<td>109</td>
<td>217</td>
</tr>
<tr>
<td>Primary CPD Programme</td>
<td>318</td>
<td>335</td>
<td>653</td>
</tr>
<tr>
<td>Secondary/FE Collaborative Activities</td>
<td>256</td>
<td>254</td>
<td>510</td>
</tr>
<tr>
<td>Secondary STEM/Engineering Clubs</td>
<td>44</td>
<td>38</td>
<td>82</td>
</tr>
<tr>
<td>Primary STEM/Engineering Clubs</td>
<td>199</td>
<td>184</td>
<td>383</td>
</tr>
<tr>
<td>Secondary/FE BEP Funded Activities</td>
<td>1364</td>
<td>1262</td>
<td>2626</td>
</tr>
<tr>
<td>Primary BEP Funded Activities</td>
<td>1779</td>
<td>1642</td>
<td>3421</td>
</tr>
<tr>
<td>Secondary Total Numbers</td>
<td>1772</td>
<td>1663</td>
<td>3435</td>
</tr>
<tr>
<td>Primary Total Numbers</td>
<td>2296</td>
<td>2161</td>
<td>4457</td>
</tr>
<tr>
<td>BEP Year 4 Total: Numbers of Students Involved</td>
<td>4068</td>
<td>3824</td>
<td>7892</td>
</tr>
<tr>
<td>Number of STEM Ambassadors involved in supporting BEP activities</td>
<td>46</td>
<td>15</td>
<td>61</td>
</tr>
<tr>
<td>Number of employers engaged</td>
<td></td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>Number of school staff involved</td>
<td></td>
<td></td>
<td>196</td>
</tr>
</tbody>
</table>

Data supplied by Brian Wood, BEP co-ordinator
Appendix 3: FESP: Rationale, Terms of Reference and Key Principles

Rationale:
- A need to equip local young people with knowledge, skills and aspirations relevant to a competitive 21st century market-place;
- A need to enable and drive enterprise, innovation and long-term growth in the local, regional and national economy.

Terms of reference:
- To form a balanced and effective local education and business partnership;
- To raise awareness of potential career pathways for young people, not only in the minds of young people themselves, but also in the minds of their teachers and their parents;
- To raise young people’s aspirations;
- To provide current, real-world applied learning opportunities for young people in all three education phases;
- To develop those transferable skills which will aid young people at key transition points in their education and into the world of work;
- To aid in the development of well-informed, work-ready and employable young people.

Key principles:
- Value placed on the time invested in the work of the group by both education and business representatives;
- Engagement with a range of businesses;
- Engagement with all three phases of education – primary, secondary and FE;
- A focus on collaborative projects which support the above Terms of Reference for young people, their schools or colleges and local businesses;
- A SMART (i.e. Specific, Measurable, Achievable, Realistic and Time-Related) approach to the targets the group sets itself.
Appendix 4: Membership of the BEP Networks and Furness Education and Skills Partnership

**BEP Secondary Network (Secondary and Post 16 Colleges)**
- Dowdales High School
- Furness Academy
- St Bernard’s High School
- Ulverston Victoria High School
- Walney School
- Barrow 6th Form College
- Furness FE College

**BEP Primary Network**
- Barrow Island Primary School
- Burlington CE Primary School
- George Romney Junior School
- Holy Family Catholic Primary School
- Low Furness CE Primary School
- Newbarns Primary School
- Pennington Primary School
- South Walney Junior School
- St Pius X Catholic Primary School
- Victoria Junior School

**Furness Education and Skills Partnership**
- BAE Systems
- Centrica
- Diamold
- Tri-Tech
- Vattenfall
- Wax Lyrical
- Cumbria STEM Centre Ltd.
- 2 Primary, 2 Secondary and the 2 Post 16 Colleges