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Supporting the use of Literacy in Science P6 – S2.

Balmoral Primary School

and

Galashiels Academy

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Contributors:

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Abstract

This is a case study of how primary teachers, librarians, a Science teacher, a Learning Support teacher and an English teacher worked together to support the use of literacy in Science from P6 – S2. To do this, all the staff involved had to negotiate common understanding about the curriculum, about teaching and about learning. This process raised interesting issues about the nature of learning and about the role of literacy in teaching and learning.

The study exemplifies the literacy processes that are involved in Science lessons and how these appeared in a school context. The curricular issues this raises include the importance of recognising and pro-actively helping pupils to link and use their skills from other contexts (such as English lessons) within the Science curriculum. This requires staff to take responsibility for how literacy is used within their own subject specialism, and to see literacy as a tool for learning, not just as a parallel skill to their curricular subject. The study shows how the discussion to develop writing frames in Science lessons did more than simply address the need to support pupils' writing. It was an important context for reflecting on the role of literacy and for using reading andwriting frames in an unusual and innovative way.

The study also exemplifies the introduction and the use of constructivist pedagogy in Science. It charts what we believe are important aspects of the process of diverting attention away from the teacher and the teacher's knowledge and onto the learner and the process of upgrading the learners existing knowledge. The role of literacy in both accessing pupils' specific prior knowledge and in negotiating a common framework of understanding is seen to be crucial.

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Balmoral Primary School

Balmoral Primary School is one of eleven feeder primary schools for Galashiels Academy. The primary schools range in size and location: some are small rural schools located within farming communities, whilst most of the larger primary schools are located within 1960's housing schemes in Galashiels itself. Balmoral Primary School is the latter. It is a school of 120 pupils which serves a very varied catchment area. The pupils come from a wide spectrum of social backgrounds. There are a number of pupils with behavioural problems and a noticeable lack of motivation among a disaffected minority. Academically, the school has a larger than average percentage of under-achieving pupils.

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Galashiels Academy

Galashiels Academy is located in a 1960's building on the outskirts of the former mill town. Fundamentally, Galashiels is very different to most the other Border towns. Places such as Peebles and Kelso are market towns and have kept their identity, even in the face of expanding residential development. Galashiels was a mill town, which has gone through the process of losing vast numbers of jobs and is now regenerating itself as part of the Edinburgh commuter belt. House prices have doubled in the last few years in a town with one of the lowest average incomes in the country. There is a large amount of social deprivation and a variety of related social problems.

Galashiels Academy has a population of around 1000 pupils, with a significant Learning Support Department serving pupils with severe and complex needs largely within the mainstream curriculum. The social background of the pupils varies widely, from rural working-class pupils of isolated primary schools to the more middle-class pupils from residential developments recently constructed. A large number of placing requests mean that some pupils that are more able attend neighbouring secondary schools in Earlston and Peebles. Within the school, the range of ability is substantial and so are the expectations of parents and pupils. However, overall the examination results are good and in most subjects are consistently above the national average.

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Background to the project

Prior to the *Building Bridges Project*, work had already begun at Galashiels Academy looking at the use of literacy across the curriculum. As part of the wide ranging new initiative several Teaching and Learning committees were established, each tasked with investigating and developing strategies for all teachers that would support and enhance the quality of Teaching and Learning at the Academy. One such committee was asked to audit the use of literacy. At this point in time, the main focus was to investigate the Successmaker computer programme and look at ways in which this programme could be integrated into the school curriculum. However, after the audit was performed it became clear that there was more pressing work to be carried out.

There were two audits carried out. The first was a questionnaire that PTs were asked to complete. The results were disappointing. Several questionnaires were not returned. Some were completed in a casual manner and others told of an idyllic world that made some suspicious. A second was conducted at that time and consisted of a series of interviews with Principal Teacher and classroom teachers. The idea of an actual interview being conducted to try and elicit more thorough responses and in some cases honest approach. On a one-to-one basis, staff were more forthcoming about the issue of literary and their perception of it.

For most staff, not in social science subjects, literacy was perceived as something someone else did. It would not be unfair to say that for staff in traditionally non-literacy subjects, like Science, PE, CDT and the like, expected pupils to arrive at their door with the literacy skills already in place and pupils competent in their use. Straightforward tasks such as note taking, spelling, reading for information, skim reading, scanning a text, identifying key points in a text, responding in a sentence or paragraph were simply expected. There appeared to be little cognisance of such things as the reading age of a text or the ability of a mixed ability class to understand it. The situation seemed to exist where if it had been done last year, it can be used this year. In some cases, teachers were assuming skills were being taught in English at Higher, when in fact the syllabus had changed.

Perhaps the most worrying aspect that was discovered was where teachers were simply avoiding literacy as an issue and demanding pupils gave only the most basic of responses or in some cases simply ticked boxes. This situation has not been helped by the form that some Standard Grade examination papers take. One-word answers were common and even if a word was spelt incorrectly, a mark was awarded. In many ways, literacy was simply being avoided wherever possible.

This situation is not unusual in schools across Scotland. At secondary level, teachers are appointed to a post based on their ability to teach a subject. Each teacher has specialist subject knowledge that is very important to every pupil they teach. As individuals, these teachers will have been immersed in their subject since S5. It will have been the subject they enjoyed at school and studied at length at university. In a great number of cases teachers have simply not been given the opportunity to understand literacy. This is not to say the situation is hopeless. As a school, Galashiels Academy performs well at Standard Grade and in National Qualifications. Overall, examination results are above

the national average in most subjects. Galashiels Academy is not a failing school. Effective teaching and learning is taking place. The audit revealed that some subjects, mostly social science subjects, were very aware of literacy and the need to understand how it affects teaching and learning. There were also several examples of staff taking a pragmatic approach in order to help pupils acquire the literacy skills needed for a subject. Here the process was simple, try and try again. The method has a good theoretical basis. In fact, HMI in a recent report suggested that the best way to improve pupils' ability to write essays was to give them repeated opportunities to write essays and support this with effective feedback.

From the information gathered by the audit, it was decided to support the staff by introducing a number of key strategies that are fundamental to literacy. These included the use of writing frames, extended writing, calculating the reading age of a text, reading aloud and finding key information from a text. There was a clear aim, every subject uses *literacy* to some degree to further the learning of pupils. The purpose was to introduce key strategies, to encourage staff to use literacy as a tool for learning and to promote greater understanding of literacy and how it could be used.

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The Science Curriculum

The decision to look at ways of using literacy as a tool for learning in the science curriculum between P6 and S2 came after a number of meetings. For both Galashiels Academy and Balmoral Primary School, there were a number of issues, which could be addressed through the Building Bridges project.

At the heart of the project was the desire to raise the profile of literacy and to build literacy into the Science curriculum, not just between P6 and S2, but further on into S3 and S4. It also offered the opportunity to develop the whole Science curriculum between primary and secondary school. Further, it gave the Academy the chance to work with a large department, traditionally conservative in its outlook. The situation we faced was confusing. There had been no previous discussion between Galashiels Academy and associated primaries in relation to the Science component of Environmental Studies. All the schools were working in accordance to the 5-14 Environmental Studies document, but with no reference to each other. The standard and type of material used with pupils varied from school to school and there was no accurate assessment made of the level pupils were working towards. Fundamental to the Building Bridges project, there was a real concern about the level of literacy in upper primary and lower secondary, particularly among boys.

The specific issues that concerned the teachers at Balmoral Primary School were staff knowledge and expertise. As primary school teachers they were competent at delivering the curriculum, but in a subject area like Science where specific knowledge is very important they felt insecure. There was no useful course text that was suitable for the age and ability of the pupils and at that point in time, the school was using topics, prepared and written by a Science Support Group. These were, in many cases, too demanding for the pupils and too complex for the staff to differentiate, as non-subject specialist teachers. The situation was having an impact on the teaching of Science and the development of literacy.

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Reading for information in a Science context.

The first thing that was achieved in the Building Bridges project was the selection of a new core text for Science between P6 and S2. The selected text was *Science 5 –14* published by Hodder Gibson and was written specifically for the Scottish curriculum.

In selecting this text, the advantages are immediate on two different areas. Firstly, in a Science context, the text has provided:

- a structured learning programme
- a fluent transition from Primary to Secondary in Science
- shared methodologies
- and shared good practise.

Secondly, in a literacy context the textbooks are:

- of an appropriate reading age for the pupils
- reader friendly with word banks
- supported with illustrations

For staff at the primary school the text has proved to be invaluable. It has offered a structured teaching programme that has given them confidence to develop and enhance the methods by which they deliver the curriculum without having to concern themselves with the subject knowledge. Experiments are described in a user-friendly manner, extension and homework material is available. And for the pupils the effect was positive. Because of the greater confidence of the teacher, pupils' knowledge and understanding of the subject has improved. Pupils are able to articulate and discuss the Science topic with greater assurance. Motivation for the subject has risen and the quality of associated written work has improved.

Prior to these texts being introduced the situation was adhoc. In the primary school, 'topic boxes' were ordered from the resource centre. Contained within these boxes were a variety of different books and associated material. The relevance of the reading material could not be guaranteed, nor could the suitability of the text, in terms of reading age. Furthermore, if the same 'topic box' was ordered in subsequent years, the contents were often different. This situation led to a limited knowledge of the subject area and poor motivation of pupils.

In a secondary context, the benefits were different. The teachers at Galashiels Academy are subject specific: the knowledge base is already present. However, over a period of years a number of 'booklets' have been produced by the department to compensate for the lack of a core text. These

booklets, whilst written with the best intentions, had a high reading age, often only accessible by a limited few, were poorly illustrated and offered no support for the less able pupil.

After this initial success in selecting and introducing a new text, our attention turned to the issue of reading for information in a Science context. As part of 5-14 Environmental Studies curriculum, pupils were expected to read Science type textbooks and gather information. In itself, the idea of reading a text is not an unusual one to any pupil. In an English classroom, pupils are expected to read regularly, to find information, understand inference and be able to comment critically on the use of language. However, when asking pupils to read a Science text they are faced with a different challenge and for a lot of pupils a challenge for which they are not trained. The fundamental problem is that when the subject changes so too does the 'style' of language. If you move from one subject to another features, such as register, vocabulary and sentence structure all change. Reading a fiction text for information is very different to reading a non-fiction text for information. The situation is complicated by the methods adopted in the classroom. In English, texts are read aloud, by the teacher and by the pupils. This simple act allows pupils to experience a mature reader present the information or read a story. This model is one to which the pupils can aspire. However, in the Science classroom, such activities did not happen and the very simple act of reading to class and demonstrating *how* to read a text was missing. Pupils had no model. For this reason Science teachers have adopted the approach of reading aloud to their classes.

Reading for information was taken a step further by getting pupils to actively research a Scientist. In previous years, the relationship between Science and the library had been adhoc. It tended do be those pupils who had finished their work in the classroom who had the opportunity to complete some form of research. Experience with these pupils had shown that pupils were very inefficient in the process of finding information. They tended to read either everything or nothing. To compound the situation pupils did not use the resources the library had to offer in any systematic way. Often pupils used the internet to the exclusion of all other forms of text. This itself led to an immediate problem. If you go onto any search engine and type in Isaac Newton, the sites listed are numerous and varied. There is no way of establishing the suitability of the text a pupil accessed before they started a search. In many cases the reading ages of material was simply beyond their understanding. It was important that pupils became confident in using all sources of information and we decided to use the four main types found in the library: textbooks, encyclopaedia, Encarta and the internet.

We set about looking at the *process* of reading for information. The pupils were asked what they thought they would have to do to find information and record it. We did this by getting the pupils to brainstorm their ideas and the information can be simplified into three questions:

What do I know about this topic?
What do I want to know about it?
What have I learnt about it?

These three questions were fundamental to the process of research and we used them when constructing a reading frame. The reading frame was simply an adaptation of the writing frame. We wanted pupils to be able to focus on the *act* of gathering information in a structured and sequenced way, whilst at the same time giving them the opportunity to respond in a more extended form. Therefore, pupils were asked what they already knew about a scientist, then after reading the information they were asked to identify five things the person did and then to take one of these things and explain it in greater detail. Finally, pupils were asked to reflect on the information they already knew and the information gathered to see if their initial understanding was accurate.

The reading frames *(see: appendix 1)* were only one element of a larger strategy we put into place. One reason for specifying the different forms of reading material the pupils were to use, was to try to have some form of educational control. There was little point using the reading frames with texts that pupils could not access. To this end, all the material used was vetted. A list of internet sites were identified that were more 'pupil friendly.' Encarta and encyclopaedia were useful texts that were appropriate in terms of age. But text books had to be carefully checked. Once this had been completed, texts were examined to see what type of activities could be best used with them. A variety of DARTS activities were considered best.

The process was piloted with a mixed ability S1 class. The activity was demonstrated using an article from Encarta on the scientist Edison. We explained the process of finding information, using a sequence of tasks. We highlighted, circled or starred information. Then, with the information to hand, we took them through the process of completing the reading frame. This activity was repeated looking at the scientist Faraday. On the second occasion, the pupils were expected to complete the reading frame with less input from the staff.

Overall, the work has been successful. What we were trying to do with the pupils was to teach them *how* to read a piece of non-fiction text so that they can gather the information they need. Once the skill has been acquired, it can be applied to any text in any subject. The problems we faced were of our own making. In many ways, we attempted to do too much.

As a way of bridging the gap between the physical act of reading and completing the final reading frame, and to help pupils focus on gathering information, we trialled a variety of different strategies. These included worksheets to practise the skill of locating information within a textbook using contents and index pages; sequencing activities where pupils used a timeline as a method of locating and organising information and a number of note-taking grids which were intended to be interim sheets on which pupils could gather the information before they completed the reading frame. *(see: appendix 2)*

When we started these activities we had pupils brainstorming, sequencing, completing DARTS activities and some found it difficult to manage all the different things they were doing. Pupils became confused as to the task in hand. The sequence of steps we developed was too complex. Due to time constraints we also tried to explain too much to the pupils in too short a time scale. The idea of modelling

the process for the pupils was good. Pupils clearly learnt from the experience, but each pupil should have been introduced to a new method of identifying information through a more gradual process.

The next part of this work is to start again with a new group and operate in a more structured manner and to be more methodical with two distinct groups: where one group gather information without any knowledge of the structured activities and the second group are supported. In addition, there is a considerable amount work to be done in identifying appropriate internet sites for pupils. One recommendation this team would make is that LTS need to publish a bibliography of suitable reading material for the P6-S2 science curriculum, or develop an internet site where pupils can access material that has already been organised by reading age, and content. The links with the primary school have been developing in line with the work carried out in S1. Pupils have made visits to the library at the Academy, where the resources are more comprehensive to complete research activities within the Science curriculum. The intention is to use the reading frame, but to differentiate it for younger pupils. The activities completed on these initial visits were more directed activities than those completed by S1, such as a library treasure hunt, although the end result was the same. These links need to become more formalised over time and it is our intention that all pupils from P6 to S2 will become confident in using the reading frames and in reading for information.

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Impact of prior knowledge on pupils learning

Activating prior knowledge has an impact both on pupil learning and on supporting literacy. The strategies used to encourage pupils to think about what they already know about a subject and its links with their own lives inevitably engage them in using language to express ideas (however tentative). The vocabulary that arises from activities to activate prior knowledge may not be the technical language of a subject but will be related to key concepts and ideas around the topic. These can be developed in ways that enhance pupils' understanding of the topic, helps them recognise areas of enquiry and aids their understanding of key technical words.

Lewis and Wray, 2000

The idea of accessing prior knowledge is an important one and in certain areas of education a common activity. However, prior to the *Building Bridges Project* it did not have a wide scale usage within the Science department. The reasons for this are historical. With eleven feeder primaries and no systematic approach to the subject the pragmatic approach taken at the Academy was to assume no prior knowledge and operate on that basis. If a pupil already knew about electricity then the lessons were seen as reinforcement. If the pupil knew nothing about the topic then the lessons were an introduction. What effectively happened was that the curriculum was taught somewhere in the middle. Either way, Science teachers could function in later years knowing that a topic had been covered and the subject content had been prescribed by them.

Accessing prior knowledge is an essential part of the children's learning. It enhances a pupils understanding of a topic, helps them to recognise their own ability and requires them to respond orally, thereby developing their literacy skills. Within the primary school, a topic or lesson was often initiated by discussion, which encourages pupils to think about what they already know. Prior to or post discussion, this activity can be complemented with a brainstorming activity carried out in pairs, groups or as a whole class. However, in the secondary science classroom topics were never started with any form of activity where the sole purpose was to access prior knowledge.

For the Science teachers at the Academy the starting point to access prior knowledge was to develop discussion within the classroom. Initially the discussion was in small groups, which led in to a feedback session managed by the teacher. However, as the skills and confidence of the science teachers improved discussions became whole class. What was important in this process was the structure of the discussion for the pupils and the management of the discussion for the teacher. Once the pupil recognises the process through which they were expected to pass, they focused on the information gathering task they were set and thereby made greater use of and developed their literacy skills in Science. At the heart of the task was always a question, as a question prompts answers or solutions.

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There was an early concern on the part of the Science teacher. The over-riding style of teaching in Science demanded that prior to experimentation, pupils were more passive receivers of information. It, therefore took time for classroom teachers to adopt discussion as a tool for accessing prior knowledge.

It became clear very quickly that discussion was having a positive impact on the pupils and was encouraging them to hypothesis and question within the Science context. To develop this further, we introduced initially brainstorming and secondly mind mapping. The idea of brainstorming was used to simply complement the discussion that was taking place: either as a precursor where pupils gathered their information or a method of gathering or assessing how much of the information pupils had understood and retained. It was at this point that mind mapping was introduced. What mind mapping offered was a more structured method of getting pupils to record information and make the links between relevant areas. Often mind maps were completed after group discussion and completed within a group where the less able pupil was assisted by the more able.

Overall, the use of discussion and some form of structured written exercise as a means of accessing prior knowledge was productive. Some secondary Science teachers had reservations about encouraging debate and discussion in the classroom. Nevertheless, once they had become accustomed to the strategies the benefits of the work became clear. For the pupils the discussion work gave them an opportunity to develop their literacy skills, to talk, to hypothesise and elucidate in the Science curriculum.

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The impact of writing frames on independent report writing

The construction of a writing frame for the Science curriculum was one of the first things that we as a group agreed to construct. We were looking for a standardised method of recording experiments that incorporated the use of literacy, as there was a general understanding that pupils' ability to use literacy in the science context was poor. What was of particular interest to the primary teachers was the opportunity to develop literary skills with disaffected pupils, particularly boys. The combination of Science and boys was considered a very promising avenue to explore. For the Science department the interest lay in developing continuity in the curriculum between P6 and S4, in establishing good practise and in developing literacy skills.

What had become clear from the literacy audit carried out at the Academy and in early discussions between the primary and secondary schools was the huge difference in methodology and language. Whilst writing frames were being used in the primary school and certain areas of the secondary school, they were not used in the science curriculum. The concept of a writing frame is nothing new. They have a number of advantages:

- Providing experience of a range of generic structures. Preventing students being presented with a blank sheet of paper - a particularly daunting experience for some students, especially those for whom sustained writing is difficult.
- Giving students an overview of the writing task. Asking students to select and think about what they have learnt by encouraging them to re-order information and demonstrate their understanding rather than just copying out text. Encouraging students to give a personal interpretation of the information they have gathered by the careful use of personal pronouns. It is tempting to talk about this process in terms of giving students ownership of the information they are working with. Enabling students to achieve some success at writing - a vital ingredient in improving self-esteem and motivation.

However, what we were looking to achieve with the writing frame was a combination of recording scientific information such as apparatus and a table of results, with an opportunity for pupils to hypothesise and reflect upon that hypothesis. The need for the apparatus to be recorded is a scientific one and is there simply to get pupils into good habits and the structure was relatively easy to agree. There are differences between the primary version and the secondary version, most noticeably when asking pupils to record information. In the secondary science curriculum, recording information is usually in a tabular form to allow for comparison and further investigation. In the primary context, it was felt that this task should be completed as a teacher led activity to be successful. In fact when trialled some pupils drew a dining table with four legs. This issue of language was to become more apparent when the writing

frames were piloted. A considerable amount of language had to be explained and discussed before the writing frames could be successfully used.

The inclusion of hypothesis was more contentious. Some members of the group were looking to get pupils to respond in an extended way explaining why they thought an experiment would produce a particular result and at the end of the writing frame, it was expected that the pupils question their hypothesis thoroughly. To achieve this we wrote the writing frame and included the following question:

Hypothesis: what might happen?

I think that...

because

We then trialled the worksheets with P7 and S1 classes *(appendix 3 and 4).* The responses were varied, but two things were very clear. Far from getting the extended response we expected, pupils gave very short responses, often only one sentence. Secondly, the word 'because' proved to be very problematic. The one thing the non-scientists in the group had overlooked was the prior knowledge of pupils in P6 – S2. If you ask a pupil the simple question, 'what will happen to sugar if placed in water,' they should be able to explain what will happen based on observation. If they have limited observational knowledge, the written response will be brief. If you asked them to explain *why* they think this will happen they have no prior knowledge upon which to draw. The question takes a pupil into the world of science and molecules. On one level, this is not a bad thing. It made pupils question their ideas. However, as so many were simply unable to respond, it undermined the confidence we were trying to give and limited the use of literacy we were trying to encourage. In the second version of the writing frame, we removed the word 'because' and allowed the pupils to hypothesise on what they thought would happen in an experiment.

At the end of the writing frame, we asked the pupils to reflect upon the experiment and their hypotheses. In the early drafts we asked pupils to simply correct their hypothesis, if it was incorrect, based on the observation they had made. However, we have subsequently realised that it is at this point that we should place the word 'because'. It is at this juncture that pupils are in a position to consider the scientific aspects of the their hypothesis and should be offering a more extended response.

After using the writing frames it has become clear that they make the pupils organise their thoughts. The writing frames use literacy as a tool by getting pupils to hypothese and reflect, and have helped to develop pupils reasoning skills. Perhaps the writing frames have made us all realise the importance of a common framework of understanding. The use of language is so very important. Teachers use language, particularly secondary teachers, often with little thought of the understanding or perception of the audience. What these writing frames did was to make us all reflect on the use of language in the classroom. A simple example will make the point. When the writing frames were devised,

we made them the same for both primary and secondary schools. When an S2 pupil was asked to draw a table of results, they drew a table with headings and showed how the longer you warm a beaker of water, the higher the temperature rose. However, when a P7 pupil was asked to draw a table, they produced a neat drawing of a dining table with four legs and a top. This simple illustration demonstrated to us how we could not take language for granted.

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Next Steps

The work that we have carried out has been immensely rewarding and has introduced a raft of new concepts to the primary teachers, the secondary science teachers and librarians. However, there are a number of issues still to be addressed.

1 the development of material and resources is not yet complete and further work needs to be done. This includes trialling reading/writing frames and evaluating the evidence

2 The programme of work needs to become embedded in the Science curriculum and all science teachers need to be fully aware to the work done.

3 The use of the core text is to be extended into the lower years of primary and with it the related reading/writing frames.

4 All schools in the catchment area are to be introduced to the materials and the methodologies.

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Conclusion

If anyone were to ask what this project has achieved, then the answer would be: a common framework of understanding. And yet behind that simple statement lies complexity. We have in effect used constructivist pedagogy in Science. We have put together a structured, logical method of accessing prior knowledge and building upon that knowledge using literacy. Pupils need an environment that is challenging, but without structure to guide that exploration pupils can be left feeling insecure. By introducing the methods of accessing prior knowledge, by producing the writing and reading frames, we have provided a structure in which and through which pupils can develop using literacy. The framework of understanding means that pupils not only know how to complete a task, but also can do so competently and confidently.

However, this idea of a framework of understanding relates not just to the relationship between pupil and teacher. It also refers to the relationship between primary teacher and secondary teacher, and between literacy and non-literacy specialists. If anything this project has been about changing the status quo, about getting primary and secondary staff to understand some of the ways in which literacy can be used as a tool for learning and sharing knowledge.

Appendix 1: Reading Frame

Library Report—Famous Scientists Your Name:

Write down the name of the scientist you are researching.

Now give information on the resources you are going to use.

If using a book give the

Title:

Author:

If you are using an encyclopaedia, give the

Title:

If you are using the internet, tick the web address of the site you are using:

www.e43a.fsnet.co.uk ☐

www.energyquest.ca.gov/scientists ☐

If using Encarta in Multimedia Applications folder ☐

Do you know anything about the person you are researching already? If you do, write down a few facts.

Using the resource you have chosen, answer the following questions about the scientist you are researching:-

When were they born? Where were they born? When did they die?

Identify five things this person did.

1

2

3

4

5

Select **one** of the above and explain it in more detail.

Now review you initial information. How accurate were you?

Appendix 2: Finding Information

KWL

- What do I KNOW already?
- What do I WANT to find out?
- What have I LEARNED?

What do I KNOW already?	What do I WANT to find out?	What have I LEARNED?

Reading the text

1. READ the first sentence in each paragraph: HIGHLIGHT or <u>UNDERLINE</u> these.

2. Which paragraphs will help you find the information you need? STAR these. *

3. READ the paragraphs and CIRCLE the information you need.

4. Now FILL IN your Taking Notes GRID.

5. Have you got <u>all the information</u> you need? Do you need to look for more? Which paragraph/s will help you?

6. Are you stuck? Who could help?

7. Which topic will you try to find out more about? HIGHLIGHT it on your Grid.

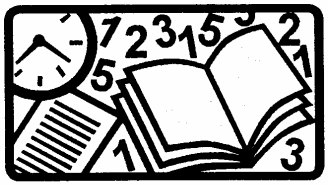
Using BOOKS to find information

TITLE
AUTHOR

Using the CONTENTS page: where will I find out?

QUESTION	PAGE NUMBER	TITLE
WHEN was this scientist born?		
WHERE was he/she born?		
WHEN did he/she die?		
5 THINGS HE/SHE DID FOR SCIENCE		
1.		
2.		
3.		
4.		
5.		

Using books to find information



TITLE
AUTHOR

Using the INDEX : where will I find out?

QUESTION	PAGE NUMBERS	TOPICS
WHEN was this scientist born?		
WHERE was he/she born?		
WHEN did he/she die?		
5 THINGS HE/SHE DID FOR SCIENCE		
1.		
2.		
3.		
4.		
5.		

Thomas Edison

Invention and Discoveries

	Invented telegrpagy			Light bulb			Benzene carbolic acid factory set up	

1847 1850 1860 1870 1880 1890 1900 1910 1920

Born in Milan, Ohio			Earned $40,000 from his telegraph invention					

Personal and Career

Appendix 3: P6/7 Science Writing Frame

Science Report **Name:**

Title:

Aim: what are we trying to find out?

Hypothesis: what might happen?

I think that...

Apparatus:

We used these pieces of equipment.

Draw a diagram of the experiment.

Method: what did we do?

First of all…

Then…

Results: what did we see? What did we measure or count?

I saw...

Conclusion: what did we find out?

Why did this happen?

Review of hypothesis: *answer one of the following questions (✓ one box).*

☐ **My hypothesis was correct.** ☐ **My hypothesis should be changed to…**

because...

Appendix 4: S1/2 Science Writing Frame

Science Report **Name:**

Title:

Aim: what are we trying to find out?

Hypothesis: what might happen?

I think that...

Apparatus:

We used these pieces of equipment.

Draw a diagram of the experiment.

Method: what did we do?

First of all…

Then…

Results: what did we see? What did we measure or count? Use a table if necessary.

I saw...

Conclusion: what did we find out?

Why did this happen?

Review of hypothesis: *answer one of the following questions (✓ one box).*

☐ **My hypothesis was correct.** ☐ **My hypothesis should be changed to…**