Falinge Park High School – raising the achievement of EAL learners in science

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Close work between English as an additional language (EAL) teachers and science teachers has proved successful at raising standards in a challenging environment

The school

Falinge Park High School is an 11–16 mixed comprehensive school in the town of Rochdale in England. A popular school, it has 1167 pupils on roll and is currently oversubscribed for the coming academic year (2004–2005). The first school on the site was Rochdale Girls' Grammar School founded in 1936 with an intake of 360 pupils. In the 1970s it became a mixed comprehensive school called Green Hill for 13–18 year-olds, and in 1988 amalgamated with a small town-centre school and was renamed Falinge Park School. Finally, due to a borough reorganisation in 1990, the school became an 11–16 mixed comprehensive school called Falinge Park High School.

ABSTRACT
In this article we share some of the issues, challenges and successes that we face as a school in terms of raising the achievement of EAL learners in science. The article first describes the context of the school, the science department and the EAL department to set the scene for readers. It then goes on to describe the nature of the cooperation and collaboration that takes place between the science and EAL departments, firstly by analysing a lesson jointly taught by an EAL teacher and a science teacher and then by sharing other strategies that we have jointly developed.

The school itself has not always been so popular or oversubscribed, particularly at the time of amalgamation. Then, it was affected by falling rolls within the borough of Rochdale and the anticipated problems of amalgamating with a struggling town-centre school. The amalgamation did indeed bring both managerial and social problems to the school. In the period 1990–1992 the number on roll dropped to 800, but a concerted effort on behalf of the school on a wide number of fronts improved the school's position considerably. It now has beacon school status and is applying for specialist school status in performing arts.

The school is truly comprehensive, taking pupils from a number of different parts of Rochdale. These include a predominantly white middle-class area near the school, a very deprived white working-class council estate with high unemployment, and an area of terraced accommodation, also with high unemployment, where many ethnic minority pupils live including asylum seekers and refugees. The breakdown of the ethnicity of pupils is shown in Table 1; amongst the school's pupils and teachers 22 languages are spoken.

The school's ethos was described in its last Ofsted inspection as '*purposeful: committed to high attainment and equality of opportunity*'. The atmosphere in the school is calm and controlled with few racial tensions. This may seem surprising given the demographics of the school and the racist incidents and

Table 1 Ethnic breakdown of children at Falinge Park High School.

	Total in school	*Y7*	*Y8*	*Y9*	*Y10*	*Y11*	
Bangladeshi	130	24	25	33	26	22	
Indian	4	1	0	2	1	0	
Kashmiri Pakistani	36	15	6	8	5	2	
Other Asian	16	3	4	2	3	4	
Pakistani	380	74	65	75	70	96	
African	11	0	2	1	5	3	608 Black/Asian
Black Caribbean	4	1	0	0	2	1	
Mixed/other	7	0	4	1	0	2	
White Asian	9	3	3	1	1	1	
White/Black Caribb	3	1	2	0	0	0	
Other ethnic	8	1	3	2	2	0	
Refused	1	1	0	0	0	0	
White British	552	107	125	118	100	102	
White Irish	1	0	1	0	0	0	559 White
Other white	3	1	0	0	2	0	
Gypsy/Roma	2	1	1	0	0	0	
Total	1167	233	241	243	217	233	1167

problems experienced in communities in nearby towns such as Oldham, Bury and Burnley, which are well documented in the media. Of course it is impossible to say what has really contributed to the calm, positive and purposeful atmosphere of the school, but the school has taken a number of significant measures that may have contributed to the current good relations between pupils, teachers and the community. In particular, the school has worked very hard at its relationships with all the communities from which its pupils are drawn. Many ex-pupils from ethnic minority groups have been recruited to the school in various capacities. The school deals quickly and effectively with issues from the community and tries to create a family atmosphere. For example, members of the senior management and teachers welcome pupils at the gates of the school in the morning and at home time walk with them some way towards where they live. This allows teachers and senior management to pick up issues and tensions very quickly and then deal with them. Primary liaison within the school, pioneered by the science department, is also very strong. Years 5 and 6 from the feeder primary schools come up to secondary school twice a term for half a day to do science practicals; this helps primary pupils to think of Falinge as 'their school'. Meetings between the primary schools and science department take place at the beginning of the school year to plan the year's work.

The science department

The science department has 11 teaching staff, three laboratory technicians and nine science labs located over three floors. The labs were refurbished 10 years ago and have remained in a good state of repair with attractive displays in every room. Two of the labs have interactive whiteboards and the department also has access to six laptops and projectors; all of these are welcomed as a way of offering exciting ways to teach science. In the upper school, Salters science (Heinemann) is taught at GCSE. The previous head of science was involved in the original Salters project with York University and the faculty continues to like the focus and emphasis of the course. In the lower school, Salters was taught although recently the faculty has now adopted the *Eureka!* scheme (also Heinemann). This change was made mainly because the *Eureka!* scheme has many of the characteristics of Salters, making a smoother transition to Salters at GCSE. Pupils in the lower school are taught in mixed-

performance tutor groups of about 27–30. In the upper school a year group is split into two halves. Each year-half has a top-attaining set with all the others being mixed attainment to avoid creating so-called 'sink' bottom groups. Group size in the upper school is 22–23 and the top sets can have up to 28 pupils in them.

One of the major challenges faced by the department is coping with constant innovation and change. The investment in adopting *Eureka!* was enormous and it is hoped that it will be possible to use the scheme for some time so that it becomes well integrated and the department has the opportunity to develop it fully to meet the needs of the pupils.

As mentioned above, one of the distinctive features of the science department is its intensive work in primary/secondary liaison. This is a key strategy to help pupils from all backgrounds make a smooth transition to the school. It also allows science teachers to get to know their new pupils well before they arrive in year 7. In addition, the department supports all pupils with revision classes at key stages 3 and 4 for SATs and GCSEs respectively as well as having a vibrant science club.

A member of the science department is designated as a link member to work with the EAL department in resourcing and planning EAL provision in the science department. Time for joint planning is an issue; this is currently done before and after school and at lunchtimes. Copies of plans, the planning and resources are stored in the EAL resource bank so that teachers know that if they are doing a certain topic they can go to the resource bank and see the full lesson plans with accompanying worksheets. The resource bank is now very big and is still growing.

The EAL department

Historically the school has always been the one most bilingual pupils in Rochdale attend. In the past, Rochdale LEA allocated EAL teachers to the school and the school always had quite a high allocation. In 2000 the funding for EAL provision from EMAG (Ethnic Minority Achievement Grant) changed and this allowed LEAs to choose how to fund EAL provision. Rochdale LEA chose to devolve all monies to schools and so all the EAL teachers were then assimilated by the school to form the EAL department, which has the same status as all other departments in the school. So most, but not all, of the EAL teachers now working in the school were part of the 'old' LEA service team but the number of EAL teachers has fallen from 13 to just over 6. All the EAL teachers are qualified teachers with a specialist qualification in language and there is also one bilingual instructor and a bilingual assistant who is employed as part of the EiC/EMAG project (see later). EAL teachers sometimes go to other departmental meetings to report back on various initiatives and they do Inset across the school.

The department is very well supported by the LEA through ethnic minority achievement consultants and currently the head of the EAL department and the LEA consultant for ethnic minority achievement (secondary) are proposing to offer twilight sessions about planning and supporting inclusion for EAL learners. These are both 'refresher' sessions and an opportunity for all staff to explore issues in some depth; the LEA provides certificates of attendance. The sessions planned are:

- Strategies to develop listening and speaking skills
- Developing reading skills for EAL learners
- Supporting writing development
- Meeting the needs of more advanced EAL learners
- Bilingualism and making the most of pupils' first language skills
- Assessing EAL learners' progress
- Department-specific sessions, e.g. access and development in technology for EAL learners.

The training model is one of using with participants techniques and strategies that support the language development of EAL learners. The content of the sessions, however, is appropriate to adults and depends on the theme of the session. There is no expectation that teachers will adopt these materials wholesale: they are used to stress the EAL techniques and strategies, and the teacher then adapts them to suit their own needs. Finally, the EAL department provides training for all its new teachers and for trainee teachers from Manchester Metropolitan University.

The EAL learners the department supports are very diverse in their language ability. The communities from which they are drawn are mostly second and third generation so many of the pupils are fluent both in English and in their first language. But there are many other recent arrivals in the UK who need support in developing English, including refugees and asylum seekers. This group in particular also need support in adapting to a new school culture. EAL pupils new to the school, particularly those who

have arrived recently from other countries, have an admissions interview and, if necessary, a bilingual member of staff will translate. Information is collected about the pupil's home language, their competence in English and their schooling background. Finally, every year all bilingual pupils' EAL needs are reviewed to make decisions about which pupils will receive specific support in lessons. Language records on pupils and their progress are made available to all the school departments, which can use the information in developing their classroom resources. Every member of staff receives a copy of the annual survey of EAL need and EAL comments which suggest strategies to use with individual pupils.

Working together – the science and EAL departments

This section explores some of the ways in which the EAL and the science departments work together. Firstly, a case study of a lesson is described to show how an EAL and a science teacher work together in planning and teaching a science lesson. Secondly, some strategies that have been developed jointly by the two departments are described.

A case study of a lesson

Background to the lesson

In 2001 the EAL department was awarded a Best Practice Research Scholarship by the DfES and the work from this formed the basis of the case study of a science lesson published in *Unlocking potential* (DfES, 2002). It was decided to focus on developing oracy in science, mainly because science lessons do not always give EAL pupils the opportunity to develop the speaking and listening skills they need. Oracy is important in language development; theories on language and cognition (Cummins, 1984, quoted in Baker, 1993, p. 138) distinguish between 'basic interpersonal communication skills' (BICS) and 'cognitive academic language proficiency' (CALP). BICS are context-dependent, cognitively undemanding language skills used for everyday social communication with friends and family. CALP is context-reduced, cognitively demanding language, necessary for academic learning; in science this could be considered to be 'the language of science'. Halliday and Martin (1993) highlight the challenge of 'scientific language' for EAL learners:

> *Scientific English may be distinctive, but it is a kind of English; likewise scientific Chinese is a kind of Chinese … If on the other hand you are confronting scientific English as a second language, you may find it extraordinarily difficult, especially if it is your first encounter with the language of science.*

In addition, Cook (1996, p. 70) also claims that pupils learning through a second language inevitable suffer from a 'cognitive deficit' because there are limitations in their ability to process information in a second language. For example, the short-term memory span of second-language learners works less well in their second language than in their first. The BICS/CALP framework has provided the EAL department with a useful means with which to think about how to move some EAL pupils, with their diverse starting points, along the continuum from BICS to CALP. It is hoped the case study lesson outlined below demonstrates how this can begin to be achieved and how to deal with some of the other issues raised by the literature.

The lesson

The planning and teaching was shared between an experienced EAL teacher (one of the authors) and a science teacher in her second year of teaching. The class was a mixed-performance year 7 group (11/12 year-olds) of 31 pupils, 13 of whom were second-language pupils, 8 of Bengali and 5 of Pakistani heritage. Many of these were fluent in English but six of the group required some structured support for their writing. The science topic was pregnancy and the ultimate aim by the end of the lesson was to get the pupils to make their own oral presentations about the different stages in pregnancy.

The initial activity was a teacher-led oral presentation of the different stages of pregnancy. Here the teacher was in effect modelling an oral presentation for the pupils as well as explaining the different stages of pregnancy. For any pupil to produce a good presentation, whether oral or written, modelling is an effective strategy. It was very important that the teacher did not read a speech because, in order to develop oracy, the teacher talk should be as close to normal language as possible with all its repetitions, its 'umms and arrrs', its hesitations and its reinforcements of ideas and concepts. Therefore the teacher planned the elements of her talk with just the key points written down (Box 1) and then talked around these in the lesson. While she was talking the pupils were using active listening skills in that they had to sequence present-tense verbs that were given to them on cards. These are shown in bold in Box 1 and were in the present tense because writing or talking about

process in science generally uses present-tense verbs. The EAL teacher then took over and asked for a volunteer to sequence the verbs on the OHT so all the pupils could check their sequence was correct.

Box 1 Teacher's bullet points on how a baby develops

16 weeks
- Uterus **fills** and gradually stretches.
- Baby begins to swallow and pass urine.
- Skin bright red and transparent.
- Mother's bulge begins to show.

20 weeks
- Hair **appears** (lanugo).
- Eyes tightly closed.
- Skin wrinkled.
- Mother can feel baby moving.

24 weeks
- At times **sleeps** and wakes.
- Can probably hear voices.
- Still thin and wrinkled.
- Baby's heart can be heard with foetal stethoscope.

28 weeks
- Could survive if born now.
- Lungs still not well developed.
- Covered with thick white grease (vernix).
- When baby **moves** can be felt by hand.

32 weeks
- **Starts** to put on fat.
- Lungs starting to mature.
- Practises sucking.
- Mother's balance affected.

36 weeks
- **Stays** head down in uterus.
- No room to somersault.
- Gets fatter.
- Other people can see baby move.

40 weeks
- Baby's head **drops** (engages) ready for birth.
- Lanugo has usually disappeared.
- Baby still has some vernix.
- Babies can arrive any time between 39th and 42nd week.

The pupils were then put into pairs – a technique that the EAL department uses a lot of the time (see below) – with pupils weaker in English paired up with stronger pupils. This grouping is done partly so the EAL pupils have got a good model when they are talking and discussing things, but also so that they get the work done more accurately because they have got someone to help them. The pairs were given a diagram and labels related to the stages in pregnancy and asked to match the labels to the diagram. The pupils had to read the labels and then discuss where to put them, thus developing reading, listening and speaking skills in addition to having to understand the science in order to be able to do the matching accurately.

The teacher then gave the same oral presentation about pregnancy from her bullet points but, again, because this was not a written speech, the teacher talk was slightly different from the first time and was intended to allow the EAL pupils to have a further opportunity to listen to normal patterns of speech. During the second phase of teacher talk the pupils once again engaged in an active listening task and were asked to add their own bullet points to the labels. This task was intended to allow for some differentiation for the higher attaining pupils, as adding additional information is cognitively more demanding than matching.

Finally, groups of four pupils were asked to prepare an oral presentation about one of the stages of pregnancy. Each member of the group was given a piece of paper so they could write notes about what they were going to say. At this stage the EAL pupils could draw on a range of support including their peers in the group, the two teachers, the verb-sequencing activity, the matching activity and previous language activities in other lessons where they had been taught to use words such as 'firstly, then …' and so on.

Key issues from the lesson

The key principles built into this lesson are:

- **The need for some teacher input**, both linguistic and conceptual, because EAL pupils cannot start learning another language if nobody, for example, tells them any words. Here teacher modelling was used which is an important EAL strategy based on the premise that if you want pupils to produce some kind of language output then it should be modelled first.

- **Active participation by the pupils.** In this lesson, language strategies such as verb sequencing were used to get the pupils to actively listen or write. These strategies in particular address the concerns raised by Cook (1996) in helping EAL pupils to remember and retain new words and sentences.
- **A language output by pupils** – in this case an oral presentation. This is essential in moving pupils on to using language for themselves; with the support outlined above, and with the correct register, thus developing their CALP. The lesson could be developed further by asking the pupils to write a short piece, supported by use of writing frames where necessary, about the stages of pregnancy, again helping them to develop the higher-level language skills required for CALP.

The strategies used in the lesson help EAL pupils but they also help many other pupils who struggle with oracy and literacy even when English is their first language. All the strategies were used because they are active and engage pupils in discussions about the science concepts, which also helps in their conceptual learning of science.

Other strategies

In this section we outline other strategies and resources that have been developed by the science and EAL departments to support EAL pupils' language development; we would emphasise that these are also helpful for all pupils.

Deliberate grouping

Pupils are often grouped in pairs or small groups that share the same first language, although this can sometimes be difficult with such a rich diversity of languages spoken in the school. However, if pupils are paired in this way some of the talk in the group can go on in the first language, with pupils switching between first language and English. This strategy is called code-switching and has been reported (Hoffmann, 1991, quoted in Baker, 1993) to assist EAL learners, for example when a word is not known, to clarify complex concepts, to express solidarity between learners and to ease tension. Learning science and learning English is stressful for EAL pupils; code-switching can offer a short respite, relieve tension and allow clarification of words or concepts. Also, knowledge of how one language works is transferable to another, so pupils who develop their first languages, develop another more quickly. In addition, for pupils who have just arrived in the country and may be feeling disorientated, it may provide some cultural solidarity even if briefly.

Activating prior learning

The Key Stage 3 Science Strategy has a focus on the use of 'starters' to begin lessons. This approach has been used for some time by our EAL department where they are called strategies for 'activating prior knowledge' such as prior linguistic and conceptual knowledge. In all of these strategies grouping can be used as described above.

- **Concept cartoons** (Naylor and Keogh, 2000). Pupils in pairs or small groups are given a concept cartoon (see Figure 1) to discuss and agree on. This activity is helpful in developing oracy and argumentation in science. Pupils can then be asked to feed back to the whole class a summary of their discussions.

Figure 1 Concept cartoon (Naylor and Keogh, 2000)

- **Word level starters.** In groups, pupils are given words, such as photosynthesis, force and conservation, on one set of cards and the definitions on another set. The pupils read the cards and agree

which word should be matched with which definition. This activity is helpful in extending an EAL pupils' vocabulary and their understanding of the scientific meaning of some words. This is particularly important for many words in science, such as force, pressure, energy, cell and so on, which have common everyday uses but specific and tightly defined meanings in science. This activity can also be extended in a plenary where pupils are asked to come out in groups and match the words on an OHT. Here it is particularly important to get pupils to say the words out loud since quite often they will read a work like photosynthesis but not know how to pronounce it and so it often gets mumbled.

- **Flash cards.** Individual pupils are given cards with a range of scientific words on them. The teacher reads out a definition and pupils are asked to hold up the word they think matches the definition. This again is a good language activity for extending vocabulary, but it also helps pupils to develop their understanding of key words in science that, as said above, can often have many 'everyday' meanings. Pupils could also be asked to read the word out loud after they have held up the card, to develop their oracy.
- **Use of pictures.** Pupils are grouped and given a picture to discuss. Firstly, they can be asked to identify and name the different components of the picture to develop their science vocabulary; in a plenary the picture could be projected and pupils asked to identify the different components, thus again helping pupils to pronounce new or unfamiliar words. Secondly, the picture can be used to get pupils to devise their own questions. This is a good language activity in itself in that we should be encouraging pupils to ask more questions in the classroom. Pupils can also be given texts to read and show their understanding by labelling a picture or a diagram.

Informal questioning by EAL teachers in lessons

As well as taking part in teaching and supporting EAL pupils, the EAL teachers have an active but more informal input in lessons. For example, in science lessons EAL teachers often pose questions to the science teachers themselves to clarify the meaning of a particular word or concept. None of the school's EAL teachers are science teachers and quite often if they are not following explanations they are prepared to ask questions that EAL pupils, whose oral competence is still developing or in its early stages, may not want or be able to ask. Sometimes EAL teachers join in with the explanation and employ various language development strategies in doing so. All parties find this immensely helpful and it is a tribute to, and evidence of, the close working collaboration that has developed between the EAL and science departments over many years that such informal and ongoing cooperation in lessons routinely goes on.

Use of frameworks and key visuals

These are used to scaffold extended oral and written outcomes, especially those that require more complex language and thinking skills such as explanation. A framework may be as simple as a chart or sentence starters. Key visuals include tree diagrams, graphs etc.

Pupil worksheet pack

For each unit taught in science pupils get a set of worksheets and these include worksheets jointly produced with the EAL department to support EAL pupils. This has a number of advantages: a problem in differentiation is that giving different worksheets to pupils in lessons according to ability can label pupils unnecessarily and they can react negatively (Hall, 1997). In many cases, EAL sheets are more challenging in terms of the thinking skills they require (see Cummins, 1984 in Baker, 1993 on BICS and CALP, and Cook, 1996). They are simply more supportive in terms of their language.

Current and future work – the EiC/EMAG project

Rochdale LEA devolved £4000 to Falinge Park School from the Excellence in Cities/Ethnic Minority Achievement Grant (EiC/EMAG) project to raise the achievement of ethnic minority pupils. In an analysis of achievement of ethnic minority pupils within the school it was found that ethnic minority boys, in particular, were underachieving. The money is being used for a project focused on improving the oracy of EAL pupils in humanities, history and science, with the ultimate purpose of developing their written language and their use of more academic/specific language (CALP) for each subject. Science was chosen because it is one of the core subjects in the National Curriculum and ethnic minority boys seemed to be underachieving in key stage 3 science. One year 7 group was chosen for the project and work began in September 2002. This has involved an EAL teacher supporting all the lessons in all the subjects chosen.

The project has an action research component undertaken by the EAL department and is being independently evaluated by the NFER. The project in science began by looking at the scientific language demands that key stage 3 science presents to all pupils. As a result of this analysis the focus in science is on developing pupils' use of complex types of language in science, such as explanation and analysis, and moving away from more simple types of discourse such as narrative and descriptive writing. Therefore, a number of lessons were developed, similar to the one described in the case study here, for each key stage 3 science unit.

The £4000 has been used to employ a bilingual assistant to give the coordinators of the project in the EAL department more time to run the project and work with the target group's teachers. She also helps with some of the administration and data analysis, which is very time consuming. The project seems to be going well; it has given the EAL and subject teachers taking part more confidence in planning for oracy, as one subject teacher recently said: '*I am really confident in doing this and doing things I wouldn't have tried out before*'. Currently data from the action research project is being collected and analysed and will ultimately be disseminated.

Conclusion

This article has attempted to capture some of the work going on in the school, the strategies used to help EAL pupils in science develop both their conceptual understanding and language skills, and how the close working relationship of the EAL and science departments has really helped this work flourish despite the many challenges.

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