

Improving outcomes for learners with English as an additional language (EAL) in science

Aims of the project

- To see how the science curriculum at KS3 could be made more accessible for EAL learners of Pakistani origin; and
- To develop an effective teaching partnership between specialist subject staff and ethnic minority achievement grant funded (EMA) support staff.

Context

De Ferrers Specialist Technology College is an LEA Comprehensive School with 1800 pupils and over 100 members of staff situated on the outskirts of Burton on Trent. The project was undertaken in conjunction with the science faculty. Two classes of Year 7 students were involved in the project. Students in Years 7-10 were interviewed. In total, over 100 students took part in the study.

Summary of main findings

- New curriculum materials and learning activities produced through joint planning improved pupil participation in science lessons.
- Joint planning of lessons improved the quality and quantity of students' written work.
- An effective partnership between specialist science staff and EMA support staff was developed.

Background

This research was prompted by an analysis of the school's national test results. These showed that students whose ethnicity was Pakistani were falling behind the main school population in terms of achieving Level 5 in both mathematics and science. The gap between the majority school population and Pakistani girls was even greater than that for boys. I decided to investigate why the students of Pakistani origin could achieve Level 5 in English in the KS3 SATs, but not in Science. Ethnic minority pupils form approximately 10% of the college's population.

Teaching processes and strategies

Conclusions drawn from interviews with students in the first term informed the work of the project for the second term. A variety of materials were developed for two Year 7 teaching groups. These included:

- games and activities using key words from both modules;
- worksheets to aid writing connected with experiments-such as planning and drawing conclusions from results;
- writing frames to 'scaffold' students' report writing;
- worksheets using DARTs activities; and
- a science dictionary for Year 7 pupils.

Games and activities using key words were developed collaboratively such as; card games matching words and meaning, putting key words in sentences. These were designed to be used in twos or small groups.

Teachers also created word searching activities for example, a 'four in a row' game (using true or false questions to complete the game), question paths and matching words and definitions.

Worksheets were prepared to aid the writing up of experiments using ideas such as cloze activities, sequencing and use of tables.

Writing frames also helped to structure students' report writing. These frameworks offered sentence stems, connectives, and specific vocabulary for students to follow.

A science dictionary was also published containing key words for each topic with simple definitions.

Findings

Discussions with students, classroom observations and analysis of teaching and learning strategies gave an insight into how the science curriculum at KS3 could be made more accessible for EAL learners. We found that EAL learners need:

- specific teaching using key words; and
- careful scaffolding through any writing process.

In the group interviews many of the students had identified new vocabulary as an issue. They felt that a lot of new words were 'coming at us too quickly' that they didn't have time to really understand. When asked why they didn't ask if they really didn't understand the meaning of a word, one student replied, 'I didn't want the teacher to think I didn't understand because they might think I'm in the wrong set, but I don't understand because I'm learning in another language.'

The students who were interviewed all agreed that they would like dictionaries for the specific scientific definition of a word. One student remarked, 'When I look in a dictionary for a word I see lots of explanations but I don't know which is the science one.'

The groups identified that writing in science was difficult because they were unsure how to write (i.e. passive/active voice) and to decide what really needed to be included. One student commented that 'I wrote down Method, Result and Conclusion for lots of experiments and never understood and still don't know what to write in each heading.'

Some of the students felt that they copied work from the board that they really did not understand and was therefore no help to them when they came to revision. They commented that when they were copying from the board the teacher would be explaining the work. They found this particularly frustrating, as they could not fully concentrate on the explanation as they were concentrating on accuracy.

All the groups felt that the practical lessons were the best lessons and where they learnt the most. However they all felt that they had difficulty transferring this information/understanding to their written work.

Only a minority of the students felt that Urdu translations would be useful. However they all felt that it was important to have other EAL students in their group as they felt that talking things through in their first language (Panjabi-a spoken language) was beneficial.

When specific teaching on keywords was given we found that the oral contributions of all the students improved and that they were more likely to use the correct vocabulary in their own group discussions. The students found the dictionaries most useful. These were developed in response to the need perceived by the students themselves. The written work improved in terms of structure and use of specific science vocabulary. The end of topic tests showed an improvement for the majority of the group. The students felt that they had more information in their exercise books to revise from, and that they had taken a more active part in their report writing, not merely copying from the board.

Forging an effective partnership between specialist science staff and EMA support staff brought benefits to both faculties and the students, but took time to develop.

Research methods

The research was carried out over two terms. During the first term I concentrated on compiling qualitative data. I videoed and taped groups of minority ethnic pupils to gain a picture of difficulties they felt they encountered and how they could be helped to overcome them. I chose groups of students from years 7, 8 and 10. I interviewed boys and girls separately in groups of 5-7. I interviewed two groups of boys and girls in each age group.

The students' views were used to shed some light on the quantitative data, such as national test results, already available. I transcribed the tapes and discussed the implications with the science staff and my mentors. We developed a range of teaching and learning materials based on the students' comments and my own theoretical knowledge. The resulting strategies were evaluated through student comment, end of module tests and classroom observations.

Conclusion

The research project enabled me as an EMA teacher to work with specialist science teachers in a productive way, which should, influence the work of both faculties in the future.

The findings from this research project will continue to influence how I as an EMA co-ordinator will continue to work in the college in order to raise achievement of minority ethnic students.

Suggestions for further reading

Cummins J. (1984) Bilingualism and Special Education. Issues in Assessment and Pedagogy-Clevedon: Multilingual Matters.

Cummins J (2000) Language, Power and Pedagogy -Bilingual Children in the Crossfire-Multilingual Matters

Wellington J. Osbourne J (2001) Language and Literacy in Science Education-Open University Press

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