Gibb, N. (2010) Further freedoms for schools and colleges. Press release 24th July 2010. London: Department for Education.

Goddard-Patel, P. & Whitehead, S. (2000) *'Examining the crisis of further education: an analysis of 'failing' college and failing policies'. Policy studies.* ***23(3)*** *191*-212.

Gravatt, J. (2010*) Classification of colleges.* [letter] (personal communication, 7th September 2010).

Green, F. (2000) *The headteacher in the 21st century: being a successful school leader.* London: Prentice Hall.

Hargreaves, A. & Fink, D. (2006) *Sustainable leadership.* San Francisco: Jossey-Bass.

Hill, R. (2006) *Leadership that lasts: sustainable school leadership in the 21st century.* London: Association of school and college leaders.

KPMG (2009). *Delivering value for money through infrastructure changes* London: KPMG LLP.

Kambil, A. (2010). 'Developing the next generation of leaders'. *Journal of Business Strategy* **31(2)**, 43-45.

Lambert, S. (2011). 'Sustainable leadership and the implication for the general further education college sector'. *Journal of Further and Higher Education*, **35(1)**, 131-148.

Leithwood, K., Seashore-Louis,K., Anderson, S.& Wahlstrom, K. (2004) *How leadership influences student learning*. New York: The Wallace Foundation.

Leitch, S. (2006) *Prosperity for all in the global economy - world class skills.* London: Stationary Office.

Lumby, J. & Tomlinson H. (2000) 'Principals speaking: managerialism and leadership in further education'. *Research in Post-Compulsory Education*, **5(2)**, 139-151.

Magnus, G. (2009 *Dependency time-bomb.* Guardian, 4th February 2010.

Morrison, K. (2006) *Marx, Durkheim, Weber. Formations of modern social thought*. London: Sage.

Payne, L. (2008) *The evidence base on college size and mergers in the further education sector*. London: Stationary Office.

Randle, K. & Brady, N. (1997) 'Further Education and the New Managerialism'. *Journal of Further and Higher Education*, 21, 229–239.

Salas, F. (2003) 'Leadership in Education: Effective U.K. College Principals'. *Nonprofit management and leadership,* **14(2),** 171-189

Wilkinson, G. (2007) 'Civic professionalism: teacher education and professional ideals and values in a commercialised education world'. *Journal of education and training.* **33(3)** 379-395

Teachers' views on the introduction and implementation of literacy tasks in the Year 7 Science scheme of learning

Rebecca Daw, University of Bedfordshire

Key Words: Scientific Literacy, Literacy, Teachers' views, Literacy Tasks

Abstract

The importance of literacy has continued since the publication of the Bullock Report in 1975 (Bullock, 1975) where schools are recommended to have a coherent approach for the effective teaching of reading and writing. Yet the Rose Report (Rose, 2006) found 16% of 11 year olds did not reach level 4 in reading at Key Stage 2. This case study looks at teacher views on the implementation of a literacy focus in the Year 7 Science scheme of learning within one school. The school is a mixed comprehensive located in a large town within Cambridgeshire with 1197 students on roll. The school has seen a local increase in the number of students with low literacy levels, level 3 or below at Key Stage 2 (KS 2). Within the cohort entering the school in September 2011, 188 students in total, 31.9% were judged by their KS2 tests to be level 3 or below in English. A mixed method approach was applied with document analysis of the Earth and Space scheme of learning to ensure tasks were embedded and a staff questionnaire was administered to gauge their views on the effectiveness of the strategies used, including the embedding of these within the scheme. Overall, teachers believe literacy is important in the teaching of science and that specific activities designed to develop literacy can also be useful in aiding scientific understanding. The designed curriculum was found to contain a literacy focus but with an emphasis on key words and discussion. Several other literacy strategies were absent from the scheme bringing to the fore the struggle between teaching science and teaching literacy.

Introduction

Teaching occurs through spoken and written language. Within the secondary science curriculum students are faced with a very different subject in comparison to their experience of primary science. Students encounter new equipment, a laboratory, new concepts and a wide variety of new specialist terms at the start of their secondary science career. The ability to understand a new scientific concept is dependent on their ability to access and understand the language of science, which can be daunting when faced with up to ten new scientific terms in one lesson (Levesley *et al*, 2008). The importance of literacy in accessing the curriculum is clear; being unable to access and understand the language of science early in their secondary career can prove a major barrier to learning (Wellington and Ireson, 2008). The introduction of Assessing Pupils' Progress

(APP) (DfES, 2008) shows the importance of literacy with the inclusion of Assessment Focus 3 Thread 2 in the Science APP grid, stating that to gain a level four students should be able to: 'Use appropriate scientific forms of language to communicate scientific ideas, processes or phenomena' (DfES, 2008).

This case study looks at teacher views on the implementation of a literacy focus in the Year 7 Science scheme of learning within one school. The school is a mixed comprehensive located in a large town within Cambridgeshire with 1197 students on roll. The school has seen a local increase in the number of students with low literacy levels, level 3 or below at Key Stage 2 (KS 2). Within the cohort entering the school in September 2011, 188 students, 31.9% were judged by their KS2 tests to be level 3 or below in English compared with roughly 15% in previous years. In the current cohort 38.8% have a reading age of below that expected of a ten year old and 42.0% show a spelling age below ten years of age. Within the year group 29.2%.exhibit both low reading and spelling ages. The curriculum for these students has a focus on literacy using the National Framework for Literacy and a thematic approach has been introduced. The Science department has continued this thematic and literacy based approach for all Year 7 students with schemes of learning written for students with low literacy and those with average or above average literacy based on the Exploring Science scheme (Levesley *et al*., 2008). With such a change of focus it was important that all staff were aware of the focus and that the implementation of this has been evaluated.

Scientific literacy or just literacy?

One of the most common areas of special educational needs is that of communication difficulties, with up to one in ten students experiencing difficulties (I CAN, 2011). Ensuring students develop the ability to read, write and communicate effectively is the responsibility of every teacher. In 1975, the Bullock Report (Bullock, 1975) first brought attention to the teaching of effective reading and writing recommending 'each school should have an organised policy for language across the curriculum'. The introduction of the National Curriculum in 1989 ensured a coherent approach to the teaching of language. However, the Rose Report of 2006, investigating the teaching of early years reading, found that 16% of 11 year olds did not reach a level 4 in reading at Key Stage 2 (Rose, 2006). The number of students entering secondary school with a level 4 for English at KS2 has remained the same for the years 2005-2009, 79-81%. This level has been maintained for the last two years (DfE, 2011).

Judging literacy via testing English also has a cross-curricular impact – every subject uses English language to enable students to access their subject. To take part in Science, students require the ability to interact with teaching of the curriculum. Within Science there has been a focus on students' scientific literacy due to the Programme for International Student Assessment (PISA) (OECD, 2011) administering tests to gauge a country's development on this front. At the last PISA assessment in 2009, the UK is ranked 20th for reading, 22nd for mathematics and 11th for science (OECD, 2011). Despite PISA using scientific literacy as a marker, there is little agreement over a definition of scientific literacy and how it should be measured (Lau, 2009; Lui, 2009) with DeBoer (2000) defining it as: 'a broad and functional understanding of science for general educational purposes and not preparation for specific scientific or technical careers' (DeBoer, 2000).

This argument would mean scientific literacy is relevant to all students and they should have this skill developed throughout their science education. Shamos (1995) divides scientific literacy into different levels:

1. Cultural scientific literacy – the lowest level with a basic understanding of simple scientific concepts.
2. Functional scientific literacy – a more active involvement with socio-scientific issues.
3. True scientific literacy – an in-depth understanding of conceptual schemes that form the foundation of science.

Shamos then goes on to state that scientific literacy is a myth and the term needs to be looked at as separate components: science and literacy.

The inability to acquire and use scientific language is found to obstruct learning (Brown, 2004, Gee, 2003, Varelas *et al.*, 2002). However, this appears to be true only for scientific language and does not seem to be so in other curriculum areas (Gee , 2003; Varelas *et al*., 2002).

Developing Literacy in Science

Work by Staples and Heselden (2001, 2002a, 2002b) describes methods that are particularly suitable for developing literacy within a scientific context.

In Science students have been found to spend little time reading; just 9% of their time in Year 7 increasing to 10% in Year 10 (Lunzer and Gardner, 1979) with Wellington and Osborne concurring (Wellington and Osborne, 2001). This suggests there is a focus on other activities within school Science, for example practical work. However, students are very unlikely to complete an experiment when they leave school but will be far more likely to read about science. Therefore, it is crucial that this skill is developed.

There are many different purposes to reading ranging from extracting information to just for pleasure. However there is a difference between reading to learn and learning to read. Is it the job of a science teacher help students to read? Bullock (1975) states that all teachers must be teachers of language, to help transfer the skills they learn.

Staples and Heselden (2002a) suggest the following as useful strategies for reading development: modelling, reading aloud, directed activities related to text and research and note taking. All of these activities are easily embedded within a science lesson. Modelling is relevant in all the activities, whether showing students' how to locate a page, chapter or word in a glossary at the back of a text book, reading to the class, 'reading' a diagram or showing students how to take effective notes or complete comprehension style tasks.

The writing strand within literacy can be a major problem for students. Sutton (1998) suggests that teachers view the main reasons for writing in a science lesson as notetaking on content or to write up a practical experiment. Expanding on these reasons, Staples and Heselden (2001) identify eight main reasons for writing:

1. Recount
2. Instructions
3. Explanations
4. Persuasion
5. Discussion
6. Information
7. Analysis
8. Evaluation

Their suggested approach to all of these activities is that of modelling: introduction followed by teacher demonstration, and finally, student demonstration. The use of writing frames to help students structure their work and sentence starters enable students to begin to form their own extended writing (Staples and Heselden, 2002b and Hoyle and Stone, 2000). Wellington and Ireson (2008) agree that there is a need to broaden student's experience of writing in science by offering a variety of tasks.

The strand of vocabulary and spelling has been studied in great detail by Wellington and Ireson (2008), who have divided scientific vocabulary into four levels. The easiest, level one, is that of naming words for identifiable, observable real objects. Level two words are those that name observable processes, e.g. burning. The fact that these processes are observable means students can access them more readily compared with unobservable processes. Third level vocabulary involves concept words, e.g. energy. The final level, level four, comprises of words related to mathematical words and symbols, which call for the ability of abstract thought.

Strategies for aiding students with scientific vocabulary can include a spelling book and word banks displayed on walls (Staples and Heselden, 2002b). However, word banks should be placed carefully within a classroom to not distract students from the tasks they are completing. Clear definition by the teacher is key. Many words have a fixed meaning in science but their meaning can change; naming words can become concepts later in a student's science education. Often a verbal definition and modelling of correct use is not enough (Wellington and Wellington, 2002) contrasting the findings of Brown and Spang (2008) who emphasise the need for 'double talk', using everyday language to describe a specific language, in explanations.

The final literacy strand is that of speaking and listening. Within science there is a need for teachers to give instructions but also for students to practise their speaking and listening skills. Students require thinking time before answering; however teachers are not always forthcoming in building 'wait time' into their lessons. Vital experimental procedures are often talked through, giving students a sequencing task, labelling exercise or DARTs (Directed Activities Related to Text) to ensure understanding can improve their listening skills. Yet speaking skills are just as important and can often be overlooked.

This literature review has found that there is a balance to be found in developing literacy and scientific literacy. However, little research has been found on the effectiveness of the strategies or teacher views of them.

Methodology and Methods

The case study approach was chosen due to the ability to form 'an in-depth account of events, relationships, experiences or processes' Denscombe (2010, p52). The typical instance used for this study is literacy tasks used within the Year 7 scheme of learning, and teacher opinions on the literacy activities embedded within a scheme of learning. The Science Department consist of ten members of staff who teach Year 7 classes, with one member responsible for this study.

The closeness of the researcher to subjects can cause concern. In this study the researcher is responsible for the development of the curriculum in question and may bring bias to this study. Another possibility of bias is from the staff involved; they may feel some loyalty to the researcher and strive to answer questions in the way they perceive the researcher would like. It was decided not to carry out in-depth individual interviews due to several long term staff absences and to remove the possibility of bias in these interviews.

Document analysis was carried out on the scheme to identify the types of literacy tasks embedded in the scheme of learning identified by Staples and Heselden in the series of articles on Science Teaching and Literacy (Staples and Heselden, 2001, 2002a, 2002b). Analysis was then carried out to find the frequency of tasks.

Questionnaires were administered to nine Year 7 Science teachers. The benefits of asking staff to complete a questionnaire are twofold. Firstly, staff would more likely to complete a questionnaire due to the little amount of time involved. Secondly, the removal of face-to-face contact will allow the respondents more freedom in the answers they choose to give.

To ensure the questionnaire administered was easy to understand, the design called for four sections:

1. Personal Experiences
2. The Importance of Literacy in Science
3. The Year 7 Scheme of Learning
4. Integration of Literacy in the Year 7 Scheme of learning.

Within section 2, 3 and 4 a table format was used to allow subjects quick completion. Statements of agreement were clearly defined before each table and a simple tick was required to indicate agreement. In each section space was left for subjects to add opinions, in the hope that this would provide a view on how useful each strategy was found. A Likert scale ranging from 1-5 was used to allow quantitative data to be generated on the strategies used (Cohen *et al.*, 2007). The data was then analysed using a mean calculation of usefulness for the strategy and the standard deviation.

Earth and Space Document Analysis

Through document analysis of the Earth and Space Scheme of Learning it is evident that certain strategies have been implemented more frequently than others. Thirteen of a possible eighteen lessons were analysed; assessment lessons were omitted.

The strategies employed most in this scheme are key word lists with 13 out of 14 lessons containing this strategy; group discussions were embedded in 10 lessons. Writing explanations appeared in four lessons. Several strategies only appear once: model reading, cloze exercises following reading, use of writing stories and frames and sentence starters. Other activities only feature twice: reading aloud, sequencing following reading, letter writing, snowballing, rap and key word definitions. Strategies that do not feature in the scheme at all are: writing instructions, debates, poetry, role play, hot seating, listening cloze, listening sequencing, listening labelling ad spelling tests.

Despite the scheme being specifically designed to improve literacy it appears odd that several strategies are absent. Within this scheme several lessons (4, 5, 6, 7 and 8) have a focus on practical work to observe and describe different types of rock. During these lessons these students complete group discussions and have a key word list. However, there is little focus on literacy skills in these lessons. Lessons that focus on the Solar System (12, 13, 15 and 16) lend themselves more to written tasks with descriptions of planets or phenomenon, e.g. phases of the moon.

Within the Science curriculum there appears to be a battle taking place between the need for literacy skills to be developed and that of teaching science content and knowledge (Wellington and Ireson, 2008). This appears to be the case in this scheme. However, without literacy skills students are not able to access the curriculum.

Group discussions feature heavily in the scheme. The ability for students' to discuss key concepts provides clarification and identification of misconceptions. The importance of this time is a key feature of constructivist teaching strategies. These strategies are relied on heavily by science teachers (Taber, 2010).

Questionnaire analysis

There was 100% return of the questionnaire with 8 female teachers and 1 male teacher. Five of the respondents have a PGCE with a science degree, two have a BEd, and one has a BSc with QTS. One respondent has a Masters' in Education. Biology is the main specialism of the teachers, with one physics, one chemistry and one psychology specialist. Experience ranges from NQT, to 25+ years' experience. The teachers generally teach more than one ability group. All the respondents believe literacy is very important or important in the Science curriculum, assigning a mean value for importance of 4.78.

Most teachers believe literacy is taught in Science as a result of the National Curriculum, to help students access the curriculum, to improve literacy for the whole curriculum and to improve reading and spelling ages. All Year 7 teachers agree literacy is taught to help students access the Science curriculum. This is in agreement with

Wellington and Ireson (2008) who state literacy can be a major barrier to learning Science.

The majority of staff, 8, found all the strategies very useful or useful in aiding literacy. It is interesting to note that 4 staff felt cloze exercises were not useful in developing scientific literacy. Sentence starters were thought to be the most useful strategy for aiding scientific literacy. How often a strategy is used depends on the type of group taught. Teachers are more willing to use strategies with lower groups that with high ability groups. Yet the intake of students within the Year 7 cohort suggests that a high proportion of them have low reading and spelling ages. Only 1 teacher was willing to use the strategies suggested with high ability groups. However, between 1 and 3 teachers are will to use the strategies with all groups they teach, whether they are low, middle or high.

Conclusions

Despite the lack of literacy strategies shown in the document analysis of the Earth and Space scheme of learning, all staff feel that a lot or some literacy has been introduced to the scheme. The introduction of literacy sees a marked departure from previous schemes where teaching has focussed on content and knowledge rather than skills such as literacy. This is in part due to the implantation of Assessing Pupil's Progress (QCA, 2007).

The fact that the scheme of learning appears to be deficient in literacy activities brings to the fore the struggle between teaching science and teaching literacy (Wellington and Ireson, 2008, Wellington and Wellington, 2001). Our prime objective as Science teachers is to allow students to develop an understanding of the world around us, scientific literacy (DeBoer, 2000) but to do this, students must have a basic grasp of literacy (Rose, 2006).

This study suggests that further integration work is required on the Earth and Space scheme of learning present within this department. However, analysis of the five other topics taught to Year 7 may reveal more literacy strategies have been embedded. Further work should also be completed into the student views of these strategies and which they find most useful. A longitudinal study continuing this work could evaluate the usefulness and effectiveness on embedding literacy within a scheme of learning for Science.

To fully embed literacy within a scheme of learning in Science will require time and discussion about which activities are best suited for different topics. This has implications for the busy teacher tasked with maintaining these schemes whether in Science or other subjects.

References

Brown, B. & Spang, E. (2007) Double Talk: Synthesising Everyday and Science Language in the Classroom, *Science Education,* pp708-732

Bullock Report (1975) *A Language for Life.* London: Her Majesty's Stationary Office [WWW] available at http:/www.educationengland.org.uk/documents/bullock/ [accessed: 01/08/2011]

Cohen, L., Manion, L., & Morrison, K. (2007) *Research Methods in Education.* (6th edition) London: Routledge

DeBoer, G. E. (2000) Scientific Literacy: another look at its historical and contemporary meanings and its relationship to science education reform. *Journal of Research in Science Teaching,* 37(6), p582-601

Denscombe, M. (2011) *The Good Research Guide For Small-scale Social Reasearch Project.s* (6th edition) Milton Keynes: Open University Press

DfE, (2011) National Curriculum Assessments at Key Stage 2 and 3 in England [WWW] available at http://www.education.gov.uk [accessed: 18/08/2011]

DfES (2008) National Curriculum. Department for Education and Science. [WWW] available at http://curriculum.qcda.gov.uk/ [accessed: 26/04/2011]

Gee, J. (2003) *What video games have to teach us about learning and literacy.* Basingstoke, England: Palgrave Macmillan

Hoyle, P. & Stone, C. (2000) Developing the literate scientist. In *Issues in Science Teaching*, Sear, J. & Sorensen, P. (eds), London: Routledge, p89-99

I CAN (2011) *Home Page.* [WWW] available at http://ican.org.uk/ [accessed: 18/12/2011]

Lau, K., (2009) A critical examination of PISA's assessment of scientific literacy. *International Journal of Science and Mathematics Education*, 7, p1061-1088

Levesley, M., Johnson, P., Gray, S. (2008) *Exploring Science How Science Works 7.* Harlow: Pearson Education

Lui, X. (2009) Beyond Science Literacy; Science and the Public, *International Journal of Environmental and Science Education,* 4(3), p301-311

Lunzer, E. & Gardner, K. ed(1979) *The effective use of reading*. London: Heinemann

OECD (2011) *OECD Programme for International Student Assessment (PISA)* [WWW] available at http://www.oecd.org/ [accessed: 12/12/2011]

QCA (2007) *Science: Programme of study for Key Stage 3 and attainment targets*. London: Qualifications and Curriculum Authority

Rose, J. (2006) *Independent Review of the teaching of early years reading.* London: DfES [WWW] available at https://www.education.gov.uk/publications/eOrderingDownload/0201-2006PDF-EN-01.pdf [accessed: 26/04/2011]

Shamos, M. H. (1995) *The myth of scientific literacy*. New Brunswick: Rutgers University Press

Staples, R. & Heselden, R. (2001) Science teaching and literacy, part 1: Writing, *School Science Review,* 83(303), p35-46

Staples, R. & Heselden, R. (2002a) Science teaching and literacy, part 2: Reading, *School Science Review,* 84(304), p51-62

Staples, R., Heselden, R. (2002b) Science teaching and literacy, part 3: Speaking and listening, *School Science Review,* 84(306), p83-95

Taber, K. (2010) Paying lip service to research? The adoption of a constructivist perspective to inform science teaching in the English curriculum context. *The Curriculum Journal,* 21(1), p25-45

Varelas, M., Becker, J., Luster, B. & Wenzel, S. (2002) When genres meet: Inquiry into sixth-grade urban science class. *Journal of Research in Science Teaching,* 38(7), p579-605

Wellington, J. & Ireson, G. (2008) *Science Learning, Science Teaching.* Abingdon: Routledge

Wellington, J. &Osbourne, J. (2001) *Language and literacy in science education.* Berkshire: Open University Press

Teachers and Research: What they value and what they do

Richard Procter, University of Bedfordshire

Abstract

Recent research has shown that improving education processes has become a priority of all governments (OECD, 2010; Barber and Mourshed, 2007). There have also been recent calls for the knowledge that is already in existence to be used more effectively to improve these education systems both internationally (OCED, 2010) and nationally (Pollard, 2008).

This study aims to evaluate an approach to teachers' use of research knowledge to help inform their practice. It will provide a web-based knowledge management system for teachers that will support their professional development. Within this broader evaluation this study is interested in what research practices are used by teachers at present and what value if any, teachers ascribe to these practices?

A questionnaire focusing on the use of research practice by teachers adapted from Levin *et al*. (2010) shows the importance of asking about practices rather than attitudes when questioning practitioners. The questionnaire is designed using a dual scale format (Pedder *et al*., 2010) that allows teachers two responses for each questionnaire item; their perception of the extent to which a practice is being used by them and their value of that practice.

This research highlights the value-practice gaps, between the extent that a research practice is being used by a teacher and the value that teachers ascribe to that practice. The study shows a consistent gap between how much teachers value the use of research and how much they use research in their daily practices. This study gives some useful insights into the debate surrounding practitioners use of research in schools (Thomas and Pring, 2004).

Keywords: evidence-based practice, professional development, teacher education, questionnaires

Introduction

This paper reports on a survey into teachers' use and value of research evidence. It is part of a broader study that will evaluate an online approach for providing research evidence to teachers and how this fits with their current practices. Thus the two questions that are posed in this paper are: what research practices are currently used by teachers and what value do teachers place on these practices?

In recent years there has been an increasing use of online technologies for both the improvement of teaching and learning in the classroom and for the development of teachers' practice. This study will use and adapt an online approach, used in the training of medical doctors[2]. This approach uses graphical pathways or flowcharts, henceforth called online pathways which are used as a structured way of presenting complex knowledge. Each node in an online pathway provides links to the display of more in-depth knowledge. This knowledge will be in the form of written explanations with references to original research evidence and may also include links to video and audio resources. The knowledge presented in online pathways will be reviewed regularly so that it provides an up to date picture of the research knowledge within a field. Online pathways will provide a way for practitioners to engage with research knowledge and for them to use these to develop their classroom practice.

In the 1990s there were a number of major critiques of educational research in the UK (Hargreaves, 1996; Hillage *et al.*, 1998; McIntyre and McIntyre, 1999; Tooley and Darby, 1998). There were also calls for evidence based practices to be adopted at a policy level. In David Blunkett's, the then Education secretary, 2001 lecture to the Economic and Social Research Council (ESRC) he called for a 'revolution in the relationship between government and the research community' (2001, p.21), this was 'coupled with an emphasis on research that demonstrates what types of policy initiatives are likely to be most effective' (Whitty, 2007, p.5). These agendas were also being pursued in a number of other fields such as medicine, public policy and management (Nutley and Davies, 2000).

Evidence-based practice is the idea that within the field of education the practice of teachers should be based on evidence from research. As Hammersley points out, there is already a certain rhetorical effect in the title to

2Http://www.maopofmedicine.com