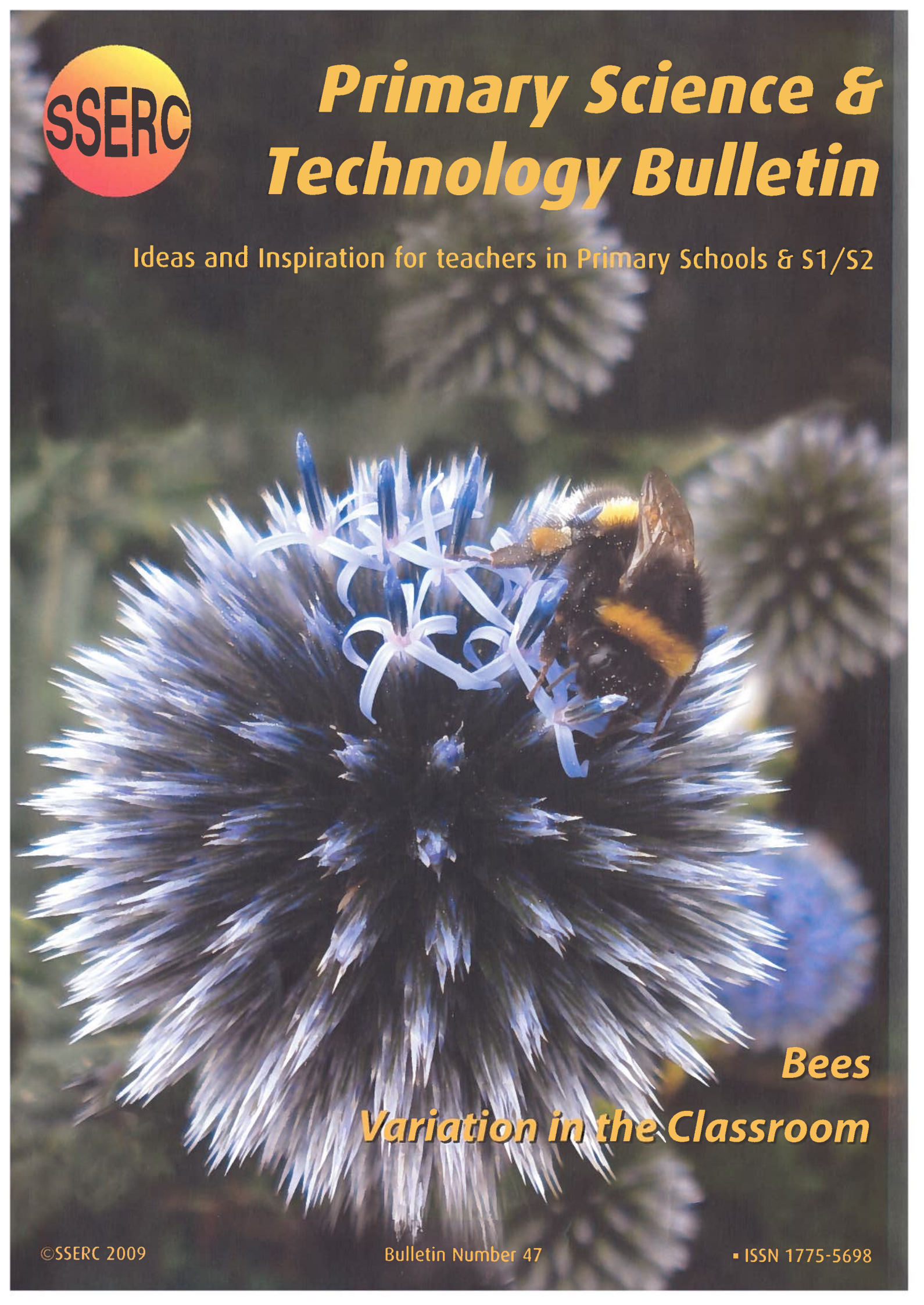
Primary Science & Technology Bulletin

Ideas and Inspiration for teachers in Primary Schools & S1/S2



Bees

Variation in the Classroom

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Two activities, which have been used as part of our *Forensics is Fun* workshop for some time, can also be used to help children investigate variation within their own class. The activities described below can be used to support the delivery of at least two of the new Experiences and Outcomes for CfE :

- Health and Wellbeing - Relationships, sexual health and parenthood – HWB 0-47a/HWB 1-47a
  I recognise that we have similarities and differences but are all unique.

- Also related to Biological systems – Inheritance (Levels 0 & 1) and skills involving inquiry, investigation and scientific analytical thinking.

Dental Impressions

These impressions show remarkable variation and are easy to take. It may be possible to identify tooth types from them although it is unlikely that you will obtain an impression of the full set of teeth.

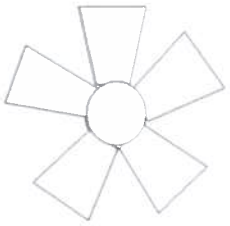

Figure 1 – Polystyrene cup cut into five sections

You need a polystyrene (insulating) cup which should be cut into five sections. See Figure 1. Each pupil needs two sections for the task.

Take two sections of a polystyrene cup. On the edge label the sections "T" (top) and "B" (bottom). Hold two sections together, with "T" on top, and bite into them making sure that your teeth do not go through the pieces. The teeth marks can be enhanced by rubbing with a dark coloured, wax crayon. Stick the sections onto a record sheet (Figure 2) and put into a small, sealable plastic bag.

Figure 2 – Record sheet for teeth impressions

The impressions taken from children of primary school age will alter over time but there are some characteristics which are more or less constant throughout our lifetime. These characteristics provide examples of "biometric data" which more and more often are being used to confirm identity.

Fingerprints

Fingerprints have long been taken from crime scenes to identify criminals but more recently have found uses in recognition systems – it is possible to access your computer using a fingerprint rather than a password. Many schools use fingerprint recognition in their library system but how many of the children involved in such a system have looked at their own fingerprints or compared their fingerprints with those of one of their friends?

Taking fingerprints in the classroom is relatively straightforward.

First rub pencil over a small area on a piece of paper. Then rub a finger over the pencil mark (Figure 3). The finger needs to look dirty when this is finished. The area near the first joint of the finger provides more interesting information than the fingertip. Using a piece of clear sticky tape, cover this area. You will be able, at this stage, to see the pattern of the finger print (Figure 4). Stick the tape onto a piece of white paper and examine the print, with a hand lens if one is available.

As an alternative you could use white chalk instead of pencil and in this case you should stick the tape onto black paper. Fingerprints fall into three main types: arch (Figure 5), loop (Figure 6) and whorl (Figure 7). Fingerprint pictures from Wikipedia.

Can the children identify which category their print falls into? Does each of their fingers show the same type? Does the class follow the patterns shown in the population as a whole where approximately of 5% of fingerprints are arches, 65% are loops and 30% are whorls? Are their prints of the same type(s) as those of other members of their family?

There are further subdivisions of these types of fingerprints which can be used to extend the study.

Further information can be found at:
http://www.worsleyschool.net/science/files/finger/prints.html
http://www.fingerprints.tk/
http://www.fbi.gov/hq/cjisd/ident.pdf
http://www.fbi.gov/kids/k5th/whatwedo3.htm

The resources linked to Fun with Forensics are available at:
http://www.science3-18.org/index.php?option=com_content&view=article&id=875:fun-with-forensics&catid=321:primary&Itemid=551

Figure 3 – Rub a finger over the pencil mark

Figure 4 – Cover the pencil marked area with Sellotape

Figure 5 – An arch

Figure 6 – A Loop

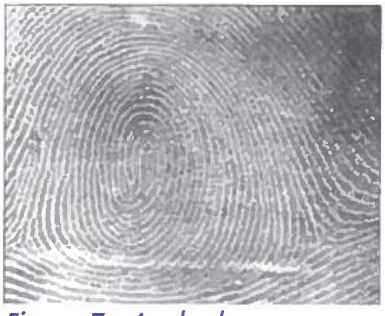

Figure 7 – A whorl

Voice patterns

A further recent development is voice /speech recognition and although replication of such systems is beyond the scope of the primary classroom an interesting investigation could be done using Audacity which has been mentioned in a previous Bulletin (Number 37) which can be found at:
http://www.ise5-14.org.uk/Prim3/New_Guidelines/Newsletters/37/Audacity.htm

Using this programme and a microphone attached to the computer children can compare the patterns obtained when they each say the same phrase. The following traces were obtained from two different people saying the first line of "Humpty Dumpty

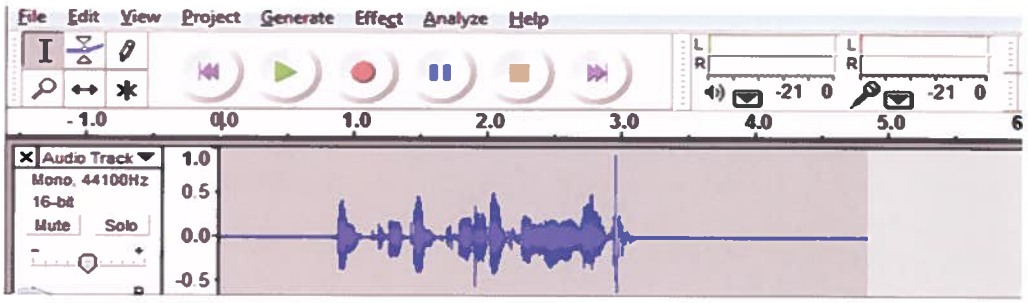

Figure 8 – First voice

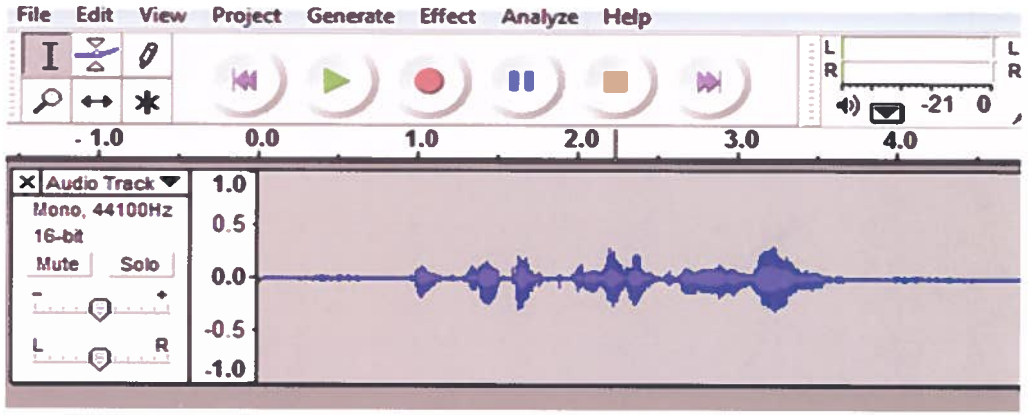

Figure 9 – Second voice

Look at the similarities and differences between these two traces. Try this out with a group of pupils. You can play the recordings and watch the marker on the traces and children can have the opportunity to discuss and describe what is heard and how it relates to what is seen.

Audacity is a useful tool in the primary classroom. Although some of its applications can be quite sophisticated it can allow children to "see" sound, the files can be exported in a variety of formats and as a recording tool it offers the chance to experiment with tracks for presentations etc. Using the "effects menu" it is possible by speeding up or slowing down the recording to respectively raise and lower the pitch – great effects for story-telling! (This can also be done using the "change pitch" option).

Audacity can be downloaded free of charge from http://audacity.sourceforge.net. You will also need to download the lame dll file from http://lame.buanzo.com.ar/lame_enc.dll to be able to export the Audacity files as mp3 files. Mp3 files are compressed audio files and take up less disc space than conventional .wav files.

Buzz-light year as bees struggle

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Most people, when asked what bees do, would answer 'they make honey', but in fact their major (economic) role is in the pollination of crops. It is estimated that between £120 and £200 million is the value of crops pollinated by bees each year with honey amounting to £10-30 million (see http://www.defra.gov.uk/hort/Bees/). These statistics alone give some indication of the importance of bees to humans – without them we might have to go without apples, cherries, raspberries, peas, runner beans ... and much more.

Einstein recognised the importance of bees' role in pollinating many plants, including crops and is reported to have said that if bees were to disappear, man would follow only four years later. BBC radio (http://news.bbc.co.uk/go/ em/fr/-/today/hi/today/newsid_8009000/8009570.stm) recently reported that there has been a 10% decline in the bee population in the UK over the past two years. A number of factors have led to this so-called colony collapse disorder which is affecting bee colonies throughout the UK. We should all be concerned.

The importance of bees to our lives can be explored in a variety of ways as part of addressing the new outcomes and experiences of *Curriculum for Excellence*.

Bees are not usually included in the food chains looked at in the early development of the concept of interdependence but, of course, their role in the human food chain is vital. The outcome SCN 2-02a (in Planet Earth/ Biodiversity & Interdependence (see http://www.ltscotland.org.uk/curriculumforexcellence/sciences/index.asp for more information) is:

Planet Earth – Biodiversity & Independence

I can use my knowledge of the interactions and energy flow between plants and animals in the ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area. (SCN 2-02a)

Such an outcome opens up the possibility of studying bees and their activities as part of the teaching and learning process.

As schools increasingly consider development of their outdoor areas, children could research which plants would be attractive to bees. Simply designing a garden incorporating suitable plants will give pupils the opportunity to consider varieties for plants of specific purposes.

If making a garden, care must be taken to ensure that species selected for planting are not harmful – see *Be Safe – Health and Safety in Primary School Science and Technology from The Association for Science Education.*

More information about the development of a bee-friendly garden can be found at http://news.bbc.co.uk/1/hi/scotland/tayside_and_central/7528542.stm and it provides details of some plant species which attract bees. There are many other sources of such information - why not try your local garden centre for advice?

Alternatively, if there is already a flower garden in the school, children could observe the existing flowers. Which ones attract which insects? Are there particular flowers which seem to attract particular insects? Is there a pattern to these observations? Which, if any, attract bees? There is an opportunity to use a video camera to monitor particular flowers for a period.

As an extension to this topic children could research the current concerns about the bee population thus addressing Topical Science Experiences and Outcomes.

Topical Science

The decline in bee populations could be studied in support of the Level 2 outcomes in Topical Science.

Through research and discussion I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society. (SCN 2-20a)

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. (SCN 2-20b)

In recent years the bee population has been greatly reduced. The wild bee population of Great Britain is thought to be close to extinction and there now are serious concerns about the health of the managed bee populations throughout Europe and the USA.

Take a look at a variety of sources which report the concerns. For example, BBC's Newsround recently gave a report on the concerns of beekeepers about the falling numbers of bees (see http://news.bbc.co.uk/cbbcnews/hi/newsid_7350000/newsid_7355200/ 7355286.stm). Also see the online Bulletin for more sources of infomation.