

Assessment for Learning in science – what goes on in the primary schools in England?

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1 Background

Assessment for Learning (AfL) has been defined as:

'the process of seeking and interpreting evidence for use by learners and their teachers to decide where learners are in their learning, where they need to go and how best to get there.'

(Assessment Reform Group, 2002)



There has been a growing interest in AfL in England over a number of years, not least because of the move towards personalised learning. The work of Black and Harrison (*Science inside the black box*, 2004) provoked an interest in looking at AfL in the context of primary science. This research consists of a literature review and a survey of key stage 2 science co-ordinators in schools across England, designed to investigate the use of AfL in primary science.

② Literature Review/Questionnaire Development

As the project was concerned with the interaction between assessment for learning and science in the primary age phase, a formal systematic literature search was carried out to determine the extent of literature existing which included references to both of these areas.

Main findings

The literature review identified a number of overarching themes which showed the relevance of AfL in the primary science classroom. These included the importance of:

- Self-assessment
- Peer-assessment
- Misconceptions and classroom climate
- Talk and discussion
- Questioning - particularly the use of rich questioning designed to probe children's understanding and possible misconceptions
- Feedback - which included feedback from pupil to teacher as well as feedback from teacher to pupil and from pupil to pupil. Feedback included instant verbal feedback in response to questions and discussions as well as written feedback.

Teacher questionnaire

Findings from the literature review informed the development of a questionnaire designed to elicit, from teachers, what AfL strategies are used, and to what extent, in primary science classrooms across England.

The teacher questionnaire survey was carried out on a random sample of primary schools in England and the questionnaire was completed, in most cases, by the science co-ordinator. The sample was stratified by key stage 2 science results, region and free school meal eligibility (a proxy for social and economic status). Quantitative data was gathered from 94 schools.



③ Responses to the Teacher Questionnaire

What happens in schools: generally

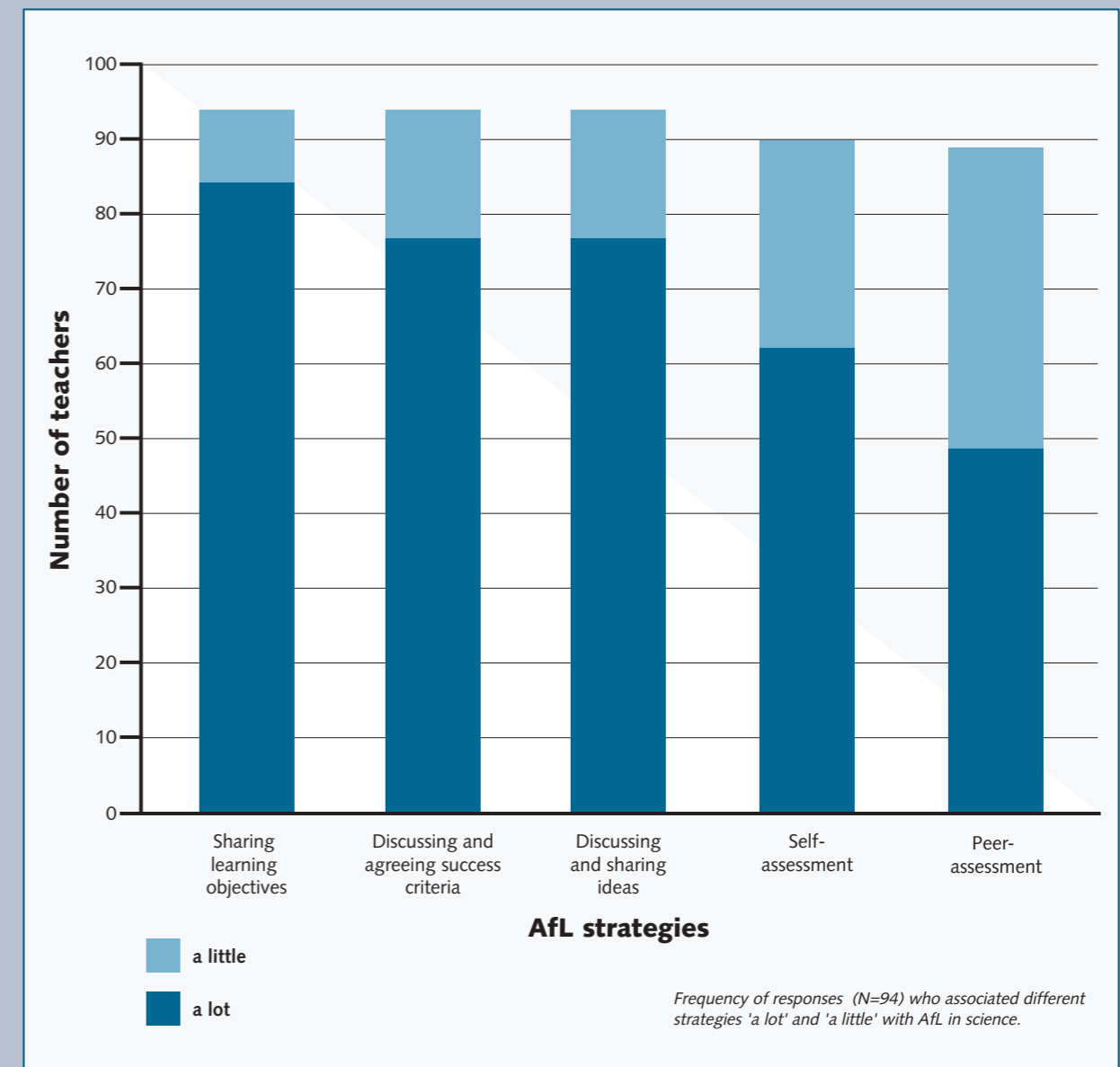
Over 90 per cent of teachers reported that AfL strategies were used in their school with 81 per cent of respondents indicating that they used such strategies in their own classroom. Nearly two-thirds of teachers said that they gained an understanding of AfL from in-service training (INSET) received at school whilst just under half of teachers had read about AfL in practitioner journals and/or heard about it at teaching conferences. Further analysis indicates that AfL tends to be implemented as whole school based policy which is supported by continuing professional development (CPD).

What happens in schools: in science

Just over three-quarters of teachers reported that they use AfL in science. Several teachers say it was introduced because it had been successfully implemented in English and maths. Teachers also reported that AfL was used in science because it can “improve the quality of teaching and learning”.

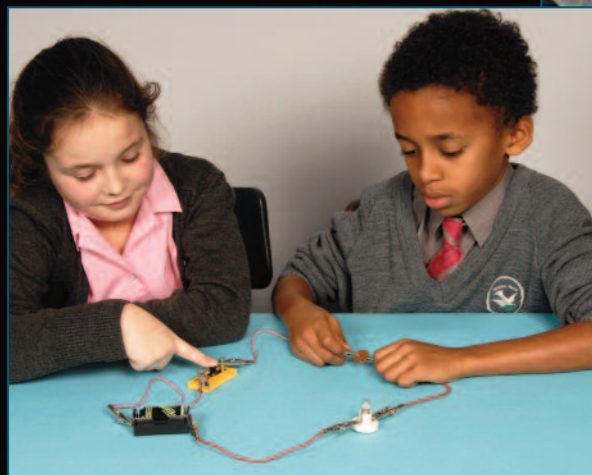
AfL strategies

Teachers were asked to what extent they associated different strategies with AfL in science. Five strategies came out as having a high level of association which are shown in the graph below.

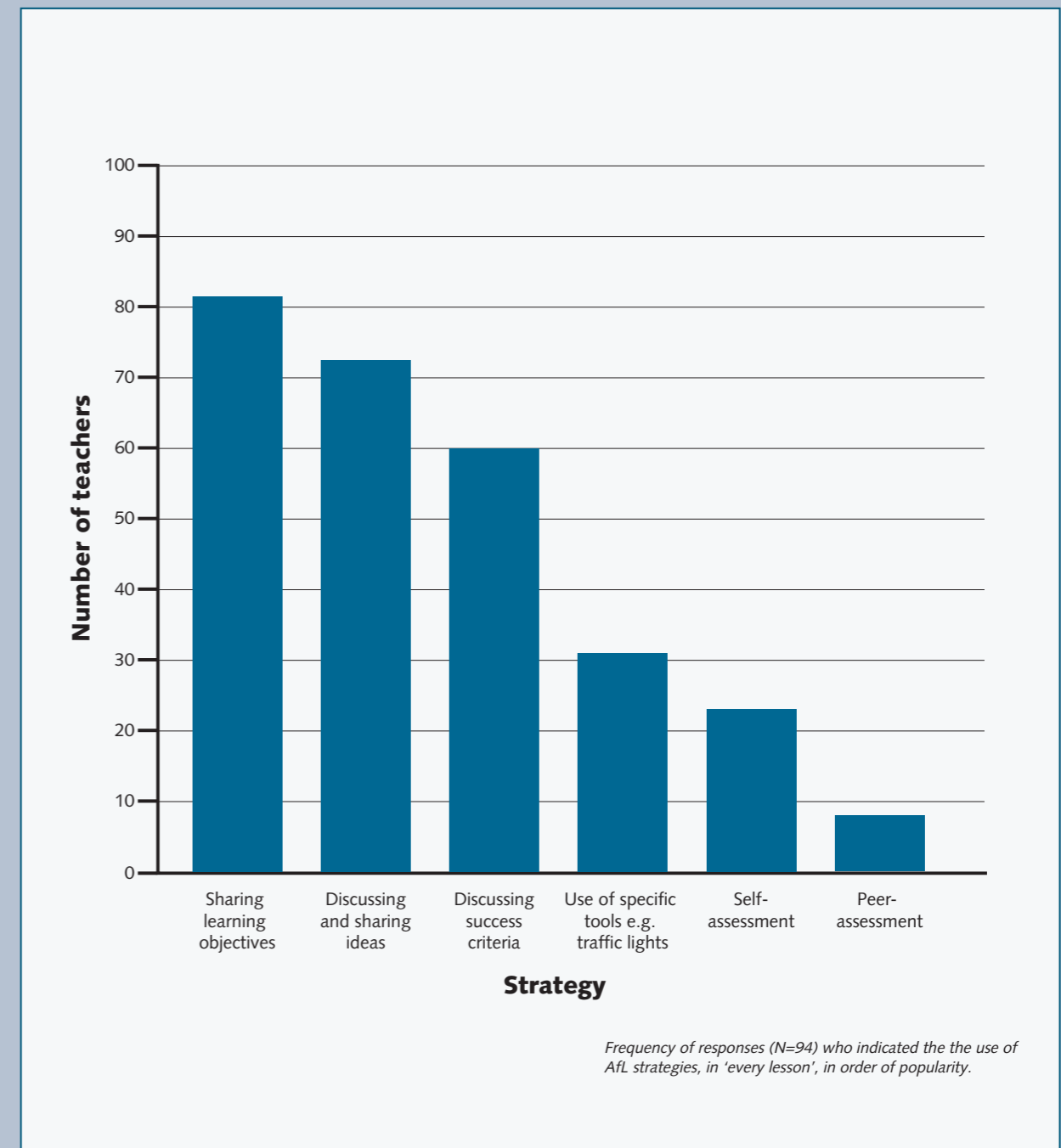


④ Responses to the Teacher Questionnaire

Teachers were asked to rate how often they use AfL strategies in their science teaching.



This graph shows the number of teachers who indicated that they use particular strategies in **every** science lesson.

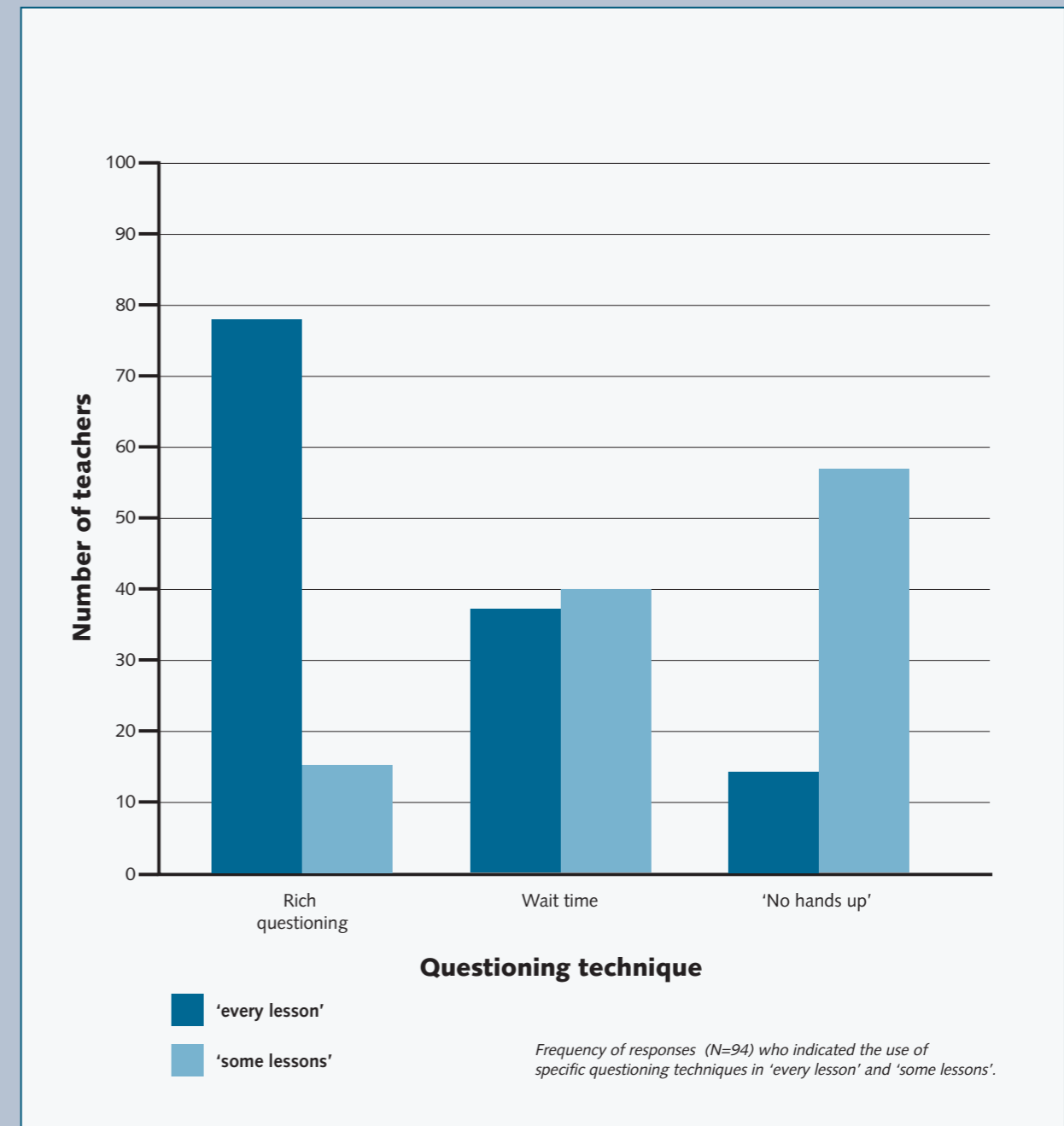


5 Responses to the Teacher Questionnaire

Questioning

Questioning was identified as an important element of science teaching and learning with teachers referring to targeted, open and rich questioning being used to identify and explore children's ideas and misconceptions. Teachers also reported using 'wait time' (allowing children time to consider their answer prior to be asked for a response) and a 'no hands up' strategy (in which children are selected by the teacher rather than being self-selected by putting their hand up to show they 'know the answer').

Teachers were asked how often they employed these questioning techniques in terms of their science teaching and the results are shown below.



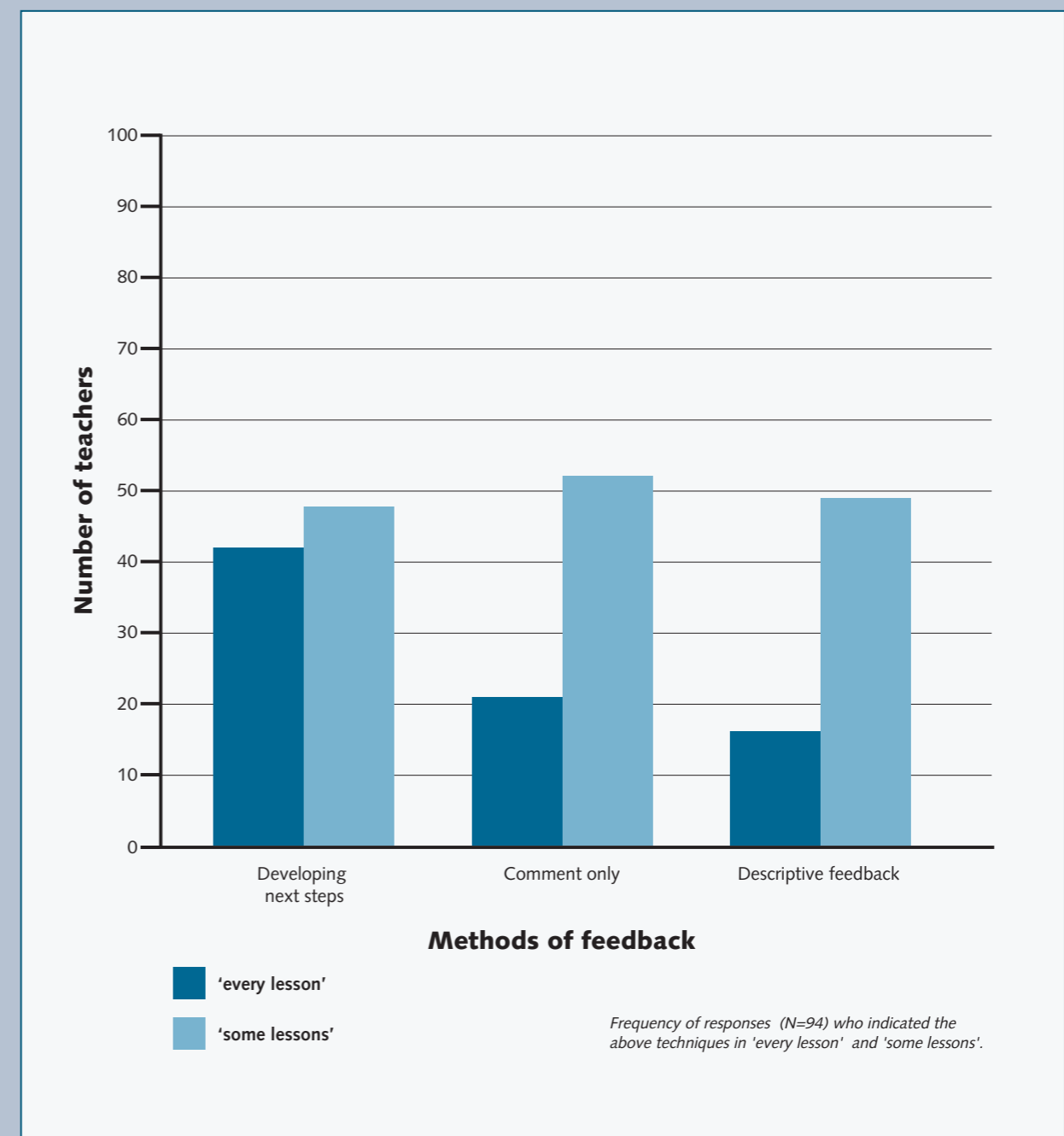
⑥ Responses to the Teacher Questionnaire

Feedback

Over two-thirds of teachers said that they associate descriptive feedback with AfL in science 'a lot' or 'a little' with several teachers referring to the need to provide marking that gives constructive feedback and informs future planning. Teachers indicated that marking is generally done against defined learning objectives. The majority of teachers also indicated that they strongly associated developing 'next steps' as an important feature of feedback.

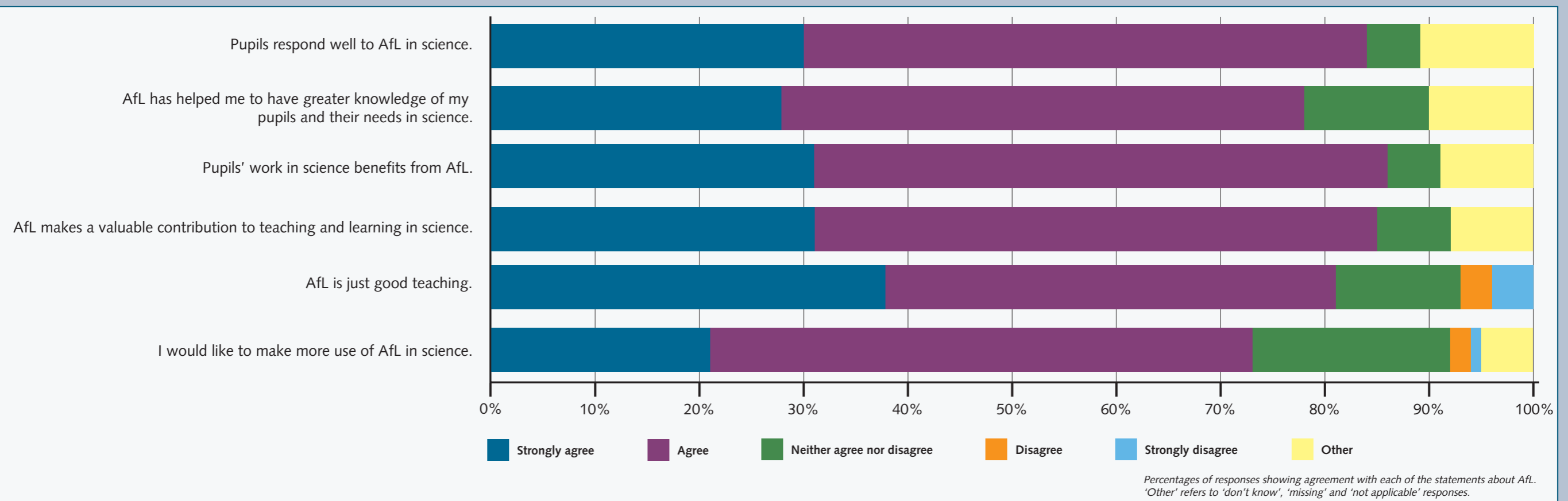


Teachers indicated how often they employed different methods of feedback in their science teaching and the results are shown below.



7 Overview

Having considered a range of questions relating to the use of AfL in science, teachers were asked to consider the extent to which they agreed with a number of statements.



The majority of teachers agreed that pupils respond well to AfL in science, that it has helped them to have greater knowledge of their pupils and their pupils' needs in science and that the children's work in science has benefitted from AfL. The majority of teachers (85%) also agreed with the assertion that AfL makes a valuable contribution to teaching and learning in science. Just over 80 per cent of teachers consider that AfL is 'just good teaching' and nearly three-quarters of teachers (73%) indicated that they would like to make more use of AfL in science.

⑧ Conclusions and Recommendations

We give the children opportunities to evaluate the success of their learning.

AfL motivates children – it keeps them on task and focused. It also gives science a more investigative 'edge'.

Teachers steer rather than drive the lessons.

Conclusions

This research has revealed a number of findings about Assessment for Learning in primary science:

- There are several aspects of AfL which are particularly relevant in the primary science classroom, including: self-assessment; peer-assessment; misconceptions and classroom climate; talk and discussion; questioning; and feedback.
- The vast majority of teachers indicated that AfL strategies are being used as part of primary science teaching and learning.
- Rich questioning is recognised as being of great importance in developing scientific thinking.
- The majority of teachers make use of feedback to help children to develop their next steps in science learning.
- AfL in science is regarded as providing valuable information about children's progress in science learning.

Recommendations

The research shows that teachers are aware of AfL and are implementing some strategies in their science teaching. The next stage should be more support for teachers in embedding AfL and further encouragement to use a range of strategies, particularly self- and peer-assessment. Professional development should focus on establishing Action Research projects which help teachers to monitor and develop their practice.

Learning objectives and success criteria are displayed and are used to focus the children's learning activities.

Through Assessment for Learning, the quality of teaching and learning is maximised.

We use rich questioning in science – it is through the dialogue that questioning provokes that we are able to extend thinking.