

Supplementary guidance: the inspection of numeracy in schools

Autumn 2017

The purpose of Estyn is to inspect quality and standards in education and training in Wales. Estyn is responsible for inspecting:

- ▲ nursery schools and settings that are maintained by, or receive funding from, local authorities
- ▲ primary schools
- ▲ secondary schools
- ▲ all-age schools
- ▲ special schools
- ▲ pupil referral units
- ▲ independent schools
- ▲ further education
- ▲ independent specialist colleges
- ▲ adult community learning
- ▲ local authority education services for children and young people
- ▲ teacher education and training
- ▲ Welsh for adults
- ▲ work-based learning
- ▲ learning in the justice sector

Estyn also:

- ▲ provides advice on quality and standards in education and training in Wales to the National Assembly for Wales and others
- ▲ makes public good practice based on inspection evidence

Every possible care has been taken to ensure that the information in this document is accurate at the time of going to press. Any enquiries or comments regarding this document/publication should be addressed to:

Publication Section

Estyn

Anchor Court

Keen Road

Cardiff

CF24 5JW or by email to publications@estyn.gsi.gov.wales

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What is the purpose?

To provide guidance to inspectors for evaluating numeracy in schools

For whom is it intended?

Maintained and independent schools and non-maintained settings

From when should the guidance be used?

September 2017

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Supplementary guidance

The key Estyn documents that guide inspection activity are the inspection guidance handbooks for each sector. However, we also produce supplementary guidance to help inspectors to consider specific aspects of education and training further.

The supplementary guidance documents set out some key principles, considerations and resources for inspectors. They relate to all sectors that Estyn inspects, unless they state that they are for a specific sector. They expand on certain aspects of education/training (e.g. the inspection of literacy) or on ways of conducting inspections (e.g. the use of learning walks) or specific inspection arrangements (e.g. guidance on inspecting church schools).

The supplementary guidance documents do not aim to be comprehensive. Inspectors are not required to work through them exhaustively when covering any specific aspect on an inspection. However, inspectors may find them useful when responding to specific emerging questions that arise during inspections or when they wish to reflect or investigate further.

The supplementary guidance documents may help providers gain an understanding of Estyn's inspection arrangements. They may also be helpful to providers in evaluating specific aspects of their own provision.

Our inspection work is based on the following principles:

- Inspectors will approach inspection with a positive mindset to ensure it is the best possible professional learning experience for the staff in each provider
- Inspectors will take a learner-led approach to inspection
- Inspectors will always focus strongly on the quality of teaching and learning
- Inspectors will seek out well-considered innovative practice
- Inspectors will tailor the inspection activities according to the circumstances in each provider as far as possible
- Inspectors will be agile and responsive to emerging findings and will use the increased range of inspection tools and approaches available
- Inspectors will consider everything in the inspection framework, but will only report on the key strengths and weaknesses within each provider

Inspecting numeracy

Numeracy is an essential life skill that enables pupils to apply their numerical facts, skills and reasoning to real-life problems. Although pupils usually learn their numeracy skills during mathematics sessions, to be fully numerate they must be able to apply these skills in other subject areas and a wide range of everyday contexts.

The key tasks for inspectors are to judge:

- the standards of pupils' numeracy skills
- whether pupils have the numeracy skills needed to access the whole curriculum
- how well the whole curriculum develops pupils' numeracy skills
- the quality of and leadership in, and management of the co-ordination of numeracy

Inspectors should report on pupils' numeracy skills in every inspection and, where appropriate, report on any outcomes or indicators that relate to these skills.

The following guidance is intended to support inspectors in making judgements and in reporting on standards numeracy and on pupils' ability to use these skills in work across the curriculum. Although the guidance contains information about the school's provision for numeracy, inspectors should remember that **the main focus should be on the standards achieved by pupils.**

Gathering and reviewing inspection evidence

The team will plan the inspection so that they can cover the reporting requirements within the five inspection areas and the emerging questions from the review of the pre-inspection information. The team will ensure that they have enough time to review the key evidence they need to make their judgements. The main forms of evidence are:

- samples of pupils' work
- discussions with pupils, staff, leaders, managers, governors, parents and others
- observation of teaching and other activities, including evidence gathered through learning walks
- survey responses from pupils, parents/carers, governors, teaching and support staff
- documentary evidence, including information on pupils' performance and progress
- information from the local authority/regional consortium

The team will use direct observation of pupils' work wherever possible to gather evidence to support their judgements. Inspectors may select an additional sample of pupils' work, if required, to further their investigation in a specific aspect.

Inspectors will undertake a range of activities to gather evidence for their evaluation of pupils' progress and the quality of the school's provision. This may include:

- learning walks, where inspectors move relatively quickly through a number of classes looking at a specific aspect of the school's provision
- conversations with selected pupils about their work
- discussions with individual teachers about pupils' learning in their classes and how they plan work to meet their needs
- longer classroom observations

The voice of pupils is a key source of evidence for inspectors. Discussions with pupils will provide an opportunity to explore pupils' knowledge and understanding of their work. It will also help inspectors to gauge how well the school supports pupils and contributes to their progress and wellbeing.

Schools should make information available to the inspection team about the standards achieved by pupils, particularly the results of any initial screening tests and other assessments. This will help inspectors to judge pupils' progress, to come to a view about the standards pupils achieve compared to their starting-points and the way teachers use the information from assessment to influence their planning and their lessons.

The team will need to consider stakeholders' views on the school and test out the validity of those views during the inspection.

During the inspection

IA1 Standards

Inspectors should focus on how well pupils work with numbers and data. They should consider how effectively pupils use their numeracy skills in their learning in different subjects and contexts.

Pupils' progress will be seen in their skills in using number to solve problems by analysing information and making informed decisions based on accurate calculations. Inspectors will judge pupils' numeracy skills appropriate to the task, such as when tackling problems in unfamiliar contexts and identifying which skills and concepts are relevant to the problem.

Inspectors should consider how well pupils:

- identify and use an efficient strategy for calculations including, mental methods, written methods and use of a calculator
- explain their thinking to show their understanding of number processes and concepts
- demonstrate they have a secure knowledge and understanding of number facts (for example, place value, equivalence of decimals and fractions, ordering decimals)
- demonstrate a sound understanding of calculation methods (for example tables, bonds, mental and written methods and efficient use of a calculator) and calculate accurately
- demonstrate an awareness of shape, scale, size and position
- collect, organise and analyse data, and evaluate the data to make informed decisions
- apply their skills accurately when working independently and with others
- evaluate their solutions
- cope with the mathematical demands made in different subject contexts
- draw on skills and concepts learned previously and apply it to their new learning

Sources of evidence include:

- samples of pupils' numeracy and mathematics work
- learning walks and session observations to judge how well pupils apply their numeracy skills across the curriculum
- analysis of standardised numeracy scores of particular groups and their progress over time
- the progress of pupils on numeracy intervention programmes

Inspectors should scrutinise samples of work to judge pupils' numeracy skills are at a level that is appropriate to the task and their age and ability. They should judge whether pupils are over-reliant on support, for example, too dependent on calculators and multiplication charts that prevent them from developing their independent number skills.

During discussions with pupils about their work, inspectors should consider how well pupils apply their numeracy skills, such as in performing mental calculations, collecting and interpreting relevant data and accurately measuring using a range of non-standard and standard units. They should consider if they apply their numeracy skills at the same level across the curriculum as they do in mathematics lessons.

Inspectors should use opportunities in session observations and learning walks to evaluate how well pupils apply their numeracy skills in different contexts such as when measuring, drawing charts or calculating time, dates and the cost of items. Inspectors should be particularly alert to situations where pupils have the greatest difficulty with their numeracy skills and where this is a barrier to their learning across the curriculum. You will need to identify the possible causes for this, which may include for example pupils' poor grasp of number facts, multiplication tables or place value, and/or their lack of use of suitable estimation skills and routine checking methods.

IA2 Wellbeing and attitudes to learning

When considering pupils' wellbeing and attitudes to learning, inspectors should consider:

- pupils' attitudes to their numeracy work. For example, how well they engage in numerical activities, whether they are able to sustain concentration when tackling problems and how well they persevere with more challenging tasks

IA3 Teaching and learning experiences

Estyn has no fixed template for the type or structure of lesson required. Teachers should structure the lesson in the way that they consider is most appropriate for the learners in the class and the learning objectives they wish the learners to achieve. The inspector should judge teaching in relation to the success of the learning and the progress made by learners, not on the methods used or the type or style of delivery by the teacher, and in the context of learning over time.

Inspectors involved in conducting learning walks and observing teaching and learning sessions should consider the guidance shown below when judging the quality of teaching.

Inspectors should consider how well the teaching:

- has high expectations of pupils, resulting in a good pace and challenging numeracy work, with clear progression in and between lessons
- provides regular sessions of oral and mental work to improve pupils' skills of computation and recall of number facts
- plans opportunities for pupils to apply and improve their developing skills in numeracy across the curriculum
- sets high standards of accuracy and precision and makes correct use of mathematical terminology
- ensures that pupils are using numeracy skills at an appropriate challenge and ensure there is an increasing level of challenge in tasks
- demonstrates good use of language to help the development of pupils'

numeracy skills

- makes frequent links across the curriculum, so that concepts and skills are developed further by being applied in different, relevant contexts
- makes connections between types of numbers - fractions, decimals and percentages
- uses mathematical information to improve pupils' reasoning and problem-solving skills
- encourages pupils to talk about and explain their work, look for patterns, interpret and draw valid conclusions from their data
- uses probing questions to improve pupils' understanding
- anticipates and overcomes potential misconceptions, with errors providing productive points for discussion
- asks pupils to explain their thinking and help them elaborate on their answers and make learning connections
- encourages paired and group working, and promotes active participation
- makes effective use of techniques where pupils support each other's work and check for accuracy
- exploits the use of ICT to support the development of pupils' numerical and problem solving skills

Inspectors should consider whether:

- there are clear whole-school policies concerning the organisation and use of assessment to improve the teaching and learning of numeracy, and that the policies are implemented consistently
- teachers are clear about the learning objectives and progression in relation to the development of pupils' numeracy skills and are well-placed to share this information with pupils and parents
- pupils are involved in the assessment of their own work in numeracy and in identifying objectives for improvement

Inspectors should consider how well staff:

- embed numeracy skills into learning experiences across all subjects and/or areas of learning
- develop links between subject schemes of work and/or areas of learning in developing progression in pupils' skills
- ensure that pupils' skills gained in mathematics lessons are reinforced, enhanced and developed further in other subjects and/or areas of learning
- adapt programmes of study when pupils are working significantly below or above expected levels of numeracy skills
- plan for the development of pupils' thinking, planning, creative and problem-solving skills
- plan to provide a good balance between structured activities for direct teaching of mathematical development and active approaches, such as in the foundation phase including play-based learning
- in the foundation phase plan opportunities for pupils to develop their number, measuring, spatial and data handling skills in areas of continuous and enhanced provision both indoors and outdoors
- increase progressively the level of challenge in the work.

Inspectors should consider whether:

- the school has a comprehensive and robust numeracy policy which is implemented effectively
- the development of numeracy skills has an appropriate level of priority in the school improvement plan and in subject plans
- in samples of short term planning, such as lesson plans how well staff exploit opportunities to develop pupils' numeracy skills
- there is a strong emphasis on the development of pupils' knowledge of number facts and on identifying and using number relationships
- there is coherent provision for the use and application of pupils' developing skills in numeracy across the whole curriculum
- there is suitable emphasis on oral work and the development of pupils' skills in mental calculation
- opportunities are maximised for pupils to apply their numeracy skills and tasks set are matched appropriately to pupils' developing needs and abilities
- there is planning for progression so that pupils are given increasingly challenging tasks and benefit from teaching methods matched appropriately to their learning needs

IA4 Care, support and guidance

Inspectors should evaluate how well the school:

- tracks and monitors pupils' progress in developing their numeracy skills as they move through the school, including pupils participating on intervention programmes
- uses information obtained from assessment to set clear targets for improvement in numeracy for individuals, groups of pupils and the whole-school

Inspectors should consider how well:

- the school uses assessment data to identify pupils in need of additional support
- intervention programmes make sure that pupils make good progress and catch up with their peers
- information about pupils' skills and progress is shared between staff
- staff adapt teaching and learning strategies for pupils receiving intervention
- information about assessment is used to provide work that is matched well to pupils' numeracy needs
- assessment is used to inform decisions about whether pupils remain in support programmes or no longer need intervention work

IA5 Leadership and management

Inspectors may hold discussions with leaders and managers to consider how well they initiate and support effective skills strategies and policies across the range of the school's work.

Inspectors may consider:

- whether the headteacher is well-informed about issues in the teaching and learning of numeracy, provides strong leadership and conveys high expectations about pupils' achievements
- how well leaders and managers focus on raising standards and if they know how well pupils are progressing, including those receiving targeted support or extension
- whether there are clear targets for raising standards in numeracy, and a realistic plan for achieving them
- how well the numeracy co-ordinator helps other teachers with their planning and sharing good practice
- whether numeracy coordinators or senior leaders actively monitor and evaluate the standards and quality of numeracy throughout the school
- how well co-ordinators for other subjects are alert to the opportunities that exist within those subjects for improving pupils' skills in numeracy
- how well parents are kept informed about the school's policy for improving standards in numeracy and are encouraged to be involved through discussions at school and the regular use of homework

Inspectors may consider the school's strategic and operational plans and other documentation, which relate to the development of pupils' numeracy skills. These include numeracy action plans and evaluations of progress and trends in taking this area of provision forward.

Inspectors may consider how well the school has included the monitoring and evaluation of pupils' levels of numeracy skills, and their successful development by staff, within its self-evaluation and planning for improvement policies and procedures.

Inspectors may consider the professional training that staff undertake to develop pupils' and their own numeracy or mathematical knowledge, skills and understanding. They will need to consider how this translates into effective whole-school practice, for example providing pupils with consistency of approach and useful feedback that helps them to improve their work.

Points to consider when looking at pupils' work

- Do pupils use a range of appropriate number skills (for example four rules of number, place value, estimation and simple fractions and percentages)?
- Do pupils use a range of appropriate measuring skills (for example working with scales, units of measurements, time, temperature)?
- Do pupils use an appropriate range of data handling skills (for example gather information in a variety of ways, recording, interpreting and presenting it in charts or diagrams, identifying patterns in data and conveying appropriate conclusions, selecting an appropriate graph to display the data, using an appropriate and accurate scale on each axis, and being able to tell the 'story of a graph')?
- Do pupils apply these skills in different contexts effectively to solve real-life problem (points to consider are relevance, challenge, planning, processing and reasoning)?
- Are learning activities purposeful and do they build successfully on what pupils know?
- Is there clear evidence of appropriate differentiation?
- Does feedback help pupils to improve their work?

Points to consider when evaluating numeracy intervention programmes

- How does the school identify the pupils who need support to improve their numeracy skills?
- How effective are intervention strategies in helping pupils catch up with their peers?
- What training do teaching assistants who deliver the intervention programme receive?
- What is the format and frequency of the sessions?
- How is the progress of pupils on the intervention programmes communicated to managers and other staff?
- How does the school ensure that classroom teachers are aware of the teaching and learning strategies and the resources used in the intervention programmes?
- What strategies does the school use to make sure teachers use similar strategies and resources in their lessons?

Document A: Questions for listening to pupils in the foundation phase
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Younger pupils in the foundation phase

What do you like about working with numbers?
Can you write the numbers from 1 to 10 if I help you?
What do you do if you cannot work something out?

Older pupils in the foundation phase

What type of numeracy/mathematics do you like best – working with numbers, measuring, finding out about shapes or working with data?
What do you find easy about numeracy/mathematics?
What do you find difficult about numeracy/mathematics?
Do you know the pairs of numbers that go to together to make 10? What about 20 or 100?
Tell me what happens when you halve or double a number?
Do you sometimes plan how to solve a number problem? Do you sometimes plan with a friend or in a group?
What do you do if you cannot work an answer out in mathematics?
Do you sometimes do numeracy/mathematics work on the computer?
Tell me how you worked this out.

Document B: Questions for listening to pupils in key stage 2 and 3

Pupils in key stage 2

What type of numeracy/mathematics do you like best – working with numbers, measuring, finding out about shapes or handling data?

Do you use your numeracy/mathematics skills in others areas such as geography and science? If yes, can you think of an example?

What do you find easy about mathematics?

What do you find difficult about mathematics?

Do you use the computer to create graphs, charts and diagrams?

What do you do if you can't work out an answer?

Do you know what happens to a number when you multiply or divide it by 10 or 100?

What strategies do you use to help you work out your times tables?

How do you check your answers?

Tell me how you worked this out.

Pupils in key stage 3

Are you making progress in improving your numerical skills? How do you know?

What is your attitude towards numeracy? Do you think it's important to have good numeracy skills? Why?

Do you know what you have to do to improve your numerical skills further?

Examples

How often do you use your number work in other subjects?

Can you think of examples where you have used mathematics such as number work, graphs, shape, etc. in subjects other than mathematics?

How easy or difficult has this work been e.g. are you able to use a calculator when unsure?

Do you think that subjects other than mathematics help you to reinforce and develop your number skills?

Do teachers let you explore on your own or with your peers how you might want to use different methods for calculating solutions to your problem?

If you get a calculation wrong, do you have the opportunity to discuss this with your teacher and or peers, and to correct/improve your work? Can you show me some examples?