هيئة التعليم

EDUCATION INSTITUTE

Mathematics workshop 4

for teachers of Grades 1 to 6

Trainer's notes

Developed for the Education Institute by CfBT

Acknowledgements

Images of Microsoft products are reprinted with permission from the Microsoft Corporation.

The examples of division questions used in this workshop are drawn from or are adapted from the National Curriculum tests for England. The generosity of the Qualifications and Curriculum Authority for England for agreeing that these examples may be used is acknowledged gratefully.

Some of the sessions in this workshop are based on materials from the Mathematics 3 plus 2 day course (DfES 0468-2003), published by the Primary Strategy for the Department for Education and Skills, England. It is reproduced here with the kind permission of Her Majesty's Stationery Office.

The video material recommended for use as part of this workshop was produced in the UK by the Department for Education and Skills. Extracts from this video may be reproduced for non-commercial or training purposes on condition that the source is acknowledged.

Department for Education and Skills
Sanctuary Buildings
Great Smith Street
London SW1P 3BT

Contents

Introduction

These materials are intended to help School Support Organisations (SSOs) and other trainers to plan and run the third set of workshops for subject leaders and teachers of mathematics in Qatar's Independent Schools. It is recommended that at least two teachers from each school attend the workshops and that the same teachers attend throughout.

This workshop is for teachers in Grades 1 to 6. The complete pack of materials for this workshop consists of *Trainer's notes*, Parts 1, 2 and 3 of the *Teacher's pack* and a CD-ROM with a set of PowerPoint presentations.

Before the workshop starts

This workshop consists of 16 sessions over five taught days. On the first day, there are four sessions of 90 minutes. Other days have three sessions, usually of 80 minutes each. The last session on the final day is 70 minutes. You will need to prepare a programme for the workshop, making sure that enough time is allowed for prayers and refreshments.

It is assumed that the sessions will be taught in a language that all teachers understand. If interpretation is required, you may need to reduce the material in each session by up to one third, or allow longer for each session.

You will also need to prepare a letter of invitation to send with the programme to each teacher attending, giving details of the venue and the times of the sessions. This letter should be agreed in advance with the Education Institute. With your letter and the programme, you should send a copy of Part 1 of the *Teacher's pack*. Your letter should ask teachers to study this pack carefully before coming to the workshop.

You should either provide at the workshop or ask teachers to bring with them their copy of *Curriculum Standards for mathematics: Grades K to 12*. Other materials that they need to bring are indicated in Part 1 of the *Teacher's pack*.

Aims of the workshop

The purpose of this workshop is to continue to consider the curriculum standards for mathematics and to discuss the implications for planning the curriculum, teaching, learning and assessment.

The workshops as a whole aim to help subject leaders and teachers to:

- become more familiar with the new curriculum standards;
- consider the implications of the standards for planning, teaching and assessment;
- start or refine the planning of a mathematics scheme of work based on the standards, and related lesson plans;
- support colleagues as they implement the standards.

Sample programme

Day 1: Problem solving and data handling

08:00	Registration	
Session 1 08:30–10:00	Problem solving 1	90 minutes
Session 2 10:30–12:00	Problem solving 2	90 minutes
Session 3 13:00–14:30	Data handling 1	90 minutes
Session 4 15:00–16:30	Data handling 2	90 minutes

Day 2: Division

10:45	Registration	
Session 5 11:10–12:30	Division 1	80 minutes
Session 6 13:30–14:50	Division 2	80 minutes
Session 7 15:10–16:30	Planning lessons on division	80 minutes

Day 3: Early years, geometry and measures

10:45	Registration	
Session 8 11:10–12:30	Early years	80 minutes
Session 9 13:30–14:50	Geometry and measures 1	80 minutes
Session 10 15:10–16:30	Geometry and measures 2	80 minutes

Day 4: Aspects of number

10:45	Registration	
Session 11 11:10–12:30	Division and assessment	80 minutes
Session 12 13:30–14:50	Direct proportion	80 minutes
Session 13 15:10–16:30	Numeracy and ICT	80 minutes

Day 5: Using ICT

10:45	Registration	
Session 14 11:10–12:30	Using a calculator	80 minutes
Session 15 13:30–14:50	The interactive whiteboard	80 minutes
Session 16 15:10–16:20	Summing up	70 minutes

Objectives of each session

Day 1: Problem solving and data handling

Sessions 1 and 2: Problem solving 1 and 2

By the end of the sessions teachers will:

- know some strategies that students could use to solve mathematical problems;
- have considered what 'being systematic' means;
- know some approaches to teaching problem solving;
- have discussed how students might use reasoning to justify their conjectures and conclusions;
- know how a teacher can guide students' reasoning;
- know how students might record their reasoning.

Session 3 and 4: Data handling 1 and 2

By the end of the sessions teachers will:

- be familiar with the standards for data handling from Grade 1 to Grade 6;
- understand the key elements of data handling;
- be familiar with a range of problem-solving activities involving collecting, organising, representing and interpreting data, and drawing conclusions;
- have discussed ways of using ICT in data handling;
- have considered strategies for assessing students' knowledge and understanding of data handling.

Day 2: Division

Sessions 5, 6 and 7

By the end of the sessions teachers will:

- have reviewed progression in division in Grades 2 to 6;
- know how to use models, images and language in the teaching of division;
- know how a number line can be used to teach division, including representing the quotient as a fraction;
- have considered approaches to mental and written division calculations;
- know how students can be helped to learn division facts;
- have discussed approaches to the teaching of short division;
- have considered some lessons and resources to support the teaching of division.

Day 3: Early years, geometry and measures

Session 8: Early years

By the end of the session teachers will:

- understand the Kindergarten standards for mathematics;
- be aware of some features of effective teaching and learning in Kindergarten and Grade 1.

Sessions 9 and 10: Geometry and measures 1 and 2

By the end of the sessions teachers will:

- be familiar with the standards for geometry from Grade 1 to Grade 6;
- understand the key elements of transformations;
- understand the progression in work on area;
- be familiar with a range of problem-solving activities to use with students to support their understanding of shape, space, constructions, perimeter, area and volume.

Day 4: Aspects of number

Session 11: Division and assessment

By the end of the session teachers will:

- have analysed test questions on division as an aid to assessment;
- have considered the errors that students may make with division and the implications for teaching.

Session 12: Direct proportion

By the end of the session teachers will:

- understand direct proportion and know how to teach it.

Session 13: Numeracy and ICT

By the end of the session teachers will:

- be familiar with some small programs that support development of number skills in the primary grades.

Day 5: Using ICT

Session 14: Using a calculator

By the end of the session teachers will:

- have considered how a calculator can support students' understanding in mathematics;
- be familiar with the use of a calculator in the mathematics standards;
- be aware of a range of problem-solving activities involving the use of a calculator.

Session 15: The interactive whiteboard

By the end of the session teachers will:

- have viewed and discussed some ICT resources;
- have discussed the benefits of interactive teaching programs and specialist software.

Session 16: Summing up

By the end of the session teachers will:

- have watched videos tailored to the local context;
- have reflected on the workshop.

Preparing for the workshop

Before the workshop, you will need to check out practical matters such as:

- the venue, including car parking and arrangements for coffee, lunch and tea;
- workshop numbers and participating schools;
- resources needed every day, including an overhead projector, a computer equipped with Microsoft PowerPoint, a video recorder and projection facilities (full details of the resources needed are on pages 10–12);
- furniture arrangements (preferably workshop style with tables);
- any displays that you may wish to have;
- interpretation and translation facilities.

You will also need to prepare a workshop register, with names of schools and details of whether teachers are mathematics subject leaders or other teachers.

Other preparation consists mainly of making sure that you are familiar with the workshop materials and other publications.

Teacher's pack: Parts 1, 2 and 3

You will need to prepare one copy of the *Teacher's pack* for each teacher attending the workshop.

Part 1 should be sent to teachers in advance of the workshop, together with your letter of invitation and the workshop programme. This includes the tasks to be completed before Session 11 on division and assessment.

Part 2 should be given out at the start of the first day. This contains:

- handouts for particular sessions;
- reduced copies of all the slides used on the workshop.

Part 3 contains the handouts for Session 7, and should be given out at the start of Session 7.

Video clips

The video material recommended for this workshop is produced by the Department for Education and Skills (DfES), Sanctuary Buildings, Great Smith Street, London SW1P 3BT. Extracts from these videos may be reproduced for non-commercial or training purposes on condition that the source is acknowledged.

Teachers attending the workshop will need to understand English to gain the maximum benefit from the video clips. Alternatively, ask an interpreter to provide simultaneous translation.

The video extracts are not examples of 'perfect' teaching. They are recommended as good materials for teachers to discuss as part of their professional development.

Resources needed

Throughout the workshop

For the trainer:

- *Trainer's notes*
- Copy of the *Teacher's pack*
- Spare copies of *Teacher's pack: Part 1* for teachers who may need it
- Computer and data projector, with Microsoft PowerPoint and Excel
- Video recorder linked to large screen, and the video clips needed for the sessions
- Whiteboard or flipchart and marker pens
- Overhead projector (OHP), blank acetate sheets and OHP pens
- *Curriculum Standards for mathematics: Grades K to 12*

For each teacher

- *Teacher's pack: Part 2*

Either provide or ask teachers to bring each day

- *Curriculum Standards for mathematics: Grades K to 12*

Day 1

For the trainer

- The PowerPoint slides for Day 1: Presentation 1.ppt, Presentation 2.ppt, Presentation 3.ppt, Presentation 4.ppt
- Copies of the evaluation form for Day 1 (see back of the *Trainer's notes*)
- Small data handling programs
- **Trainer resource 4.1**, an Excel file included with the workshop materials (optional)

For each teacher

- Yes/No cards, made from **Trainer resource 3.1** at the end of the notes for Session 3

Day 2

For the trainer

- The PowerPoint slides for Day 2: Presentation 5.ppt, Presentation 6.ppt, Presentation 7.ppt
- Copies of the evaluation form for Day 2 (see back of the *Trainer's notes*)
- Interactive teaching programs *Grouping*, *Remainders*, *Number dials and Multiplication grid*
  (download free from www.standards.dfes.gov.uk/primary/mathematics/)
- PowerPoint presentation *Remainders* (available from the CfBT Office)

- MicroSmile programs *Factor*, *Maximum remainder* and *Tenners* (MicroSmile software can be obtained by telephoning +44 207 598 4841 and quoting a credit card number)

For each teacher

- *Teacher's pack: Part 3* (the handouts for Session 7)

Day 3

For the trainer

- The PowerPoint slides for Day 3: Presentation 8.ppt, Presentation 9.ppt, Presentation 10.ppt
- Copies of the evaluation form for Day 3 (see back of the *Trainer's notes*)
- Overhead projector transparency of centimetre squared paper
- A suitable computer program for Kindergarten mathematics
- Video clips

For each teacher

- Centimetre squared paper
- Small sticks or straws

Day 4

For the trainer

- The PowerPoint slides for Day 4: Presentation 11.ppt, Presentation 12.ppt, Presentation 13.ppt
- Copies of the evaluation form for Day 4 (see back of the *Trainer's notes*)
- OHP calculator
- Sticky notes (large size)
- **Trainer resource 12.1** (at the end of the notes for Session 12)
- Video clips

For each teacher

- Examples of errors made by students (provided by teachers)
- Calculator
- Ruler (to be brought by teachers)

For each pair of teachers

- Laptops equipped with MicroSmile software (for ordering details, see www.smilemathematics.co.uk):
  Numeracy, installed on one quarter of the laptops
  Sense of number, installed on one quarter of the laptops
  Enriching number, installed on one quarter of the laptops
  Properties of numbers, installed on one quarter of the laptops

Day 5

For the trainer

- The PowerPoint slides for Day 5: Presentation 14.ppt, Presentation 15.ppt, Presentation 16.ppt
- Overhead projector calculator
- Interactive whiteboard
- Software for the interactive whiteboard, e.g.:
  Mult-e-Maths (Cambridge University Press)
  Interactive teaching programs (download free from www.standards.dfes.gov.uk/primary/publications/mathematics/itps/)
- Copies of both evaluation forms for Day 5 (see back of Trainer's notes)

For each teacher

- A basic calculator

Tips for new trainers

Some tips are provided here for trainers who are relatively new to the training role.

- If you are teaching the workshop with a colleague, you will need to agree how to manage your contributions. For example, you could allocate particular sessions to particular trainers, alternate contributions within a session, divide into separate groups for some or all sessions, and so on.
- If your workshop will involve interpreters, you will need to reduce the amount of material in each session, particularly if the translation is consecutive rather than simultaneous. If possible, try to brief the interpreters on key points of the training in advance. Discuss how you and the interpreter will work during presentations to the whole group and during group work.
- When you are giving a presentation, make sure that you are familiar with the notes and don't have to pause constantly in order to refer to them. Remember to leave time for any interpreter to translate. If you are sharing the teaching of a session, your partner can then check against the workshop notes while you are leading, and can mention any omitted points before they take their own turn.
- Don't read out PowerPoint slides to your audience. Instead, refer to the accompanying workshop notes to explain, elaborate or make supplementary points. It sometimes helps to annotate a photocopy of the slide to help to do this.
- If you are using video clips, make sure that you are familiar with the controls of the video recorder.
- If you are setting individual or small group tasks, make sure that you have a suitable arrangement of tables, make the task clear and set time limits. With longer tasks, warn the groups when there are only 5 minutes left.
- For tasks that involve study of the standards, it may help to put the numbers of the pages to be studied on a flipchart before the session begins.
- When you are taking feedback from group tasks, use the workshop notes to check that all the necessary points have been mentioned. If an opinion is expressed that you think may be an isolated or minority view, it may help to check whether other teachers share that view to create debate about it.
- Work flexibly to the indicative times for each session. Without making it obvious, keep a watchful eye on the clock.
- If time for questions runs out, or if you are asked a question to which you don't know the answer, make a note of the question on a flip chart, or on a wall poster put up for the purpose, so that you can deal with it later.
- Finally, you will be working from prepared notes because it is important that all teachers in the new schools are given the same information and a chance to consider the same range of issues. However, there are opportunities to draw on your own and local experience as well. This will help you to feel that it is your workshop and thus make it more effective for all teachers.
- If you are likely to repeat the workshop, the evaluation forms completed by the trainees should help you to make suitable adjustments.