BOWLAND MATHS
Professional development

ICT: Using resources effectively
'How do I get them to stop playing and start thinking?'

Module overview

This module explores the pedagogical and practical challenges that confront teachers as they help pupils to use ICT effectively in solving problems and learning mathematics. In this module we look at contrasting uses of the computer: a 'microworld' to explore, a generic 'thinking tool' and a didactical tool. Through planning, implementing and reflecting on lessons using the computer, the role and significance of ICT in mathematics and its relationship to the traditional curriculum are explored.

This guide is intended for use alongside the *Bowland Maths DVD* or website, which include a short introductory video for each of the activities; longer videos of lessons and teacher discussions and links to all the handouts and ICT-based problems. **Please ensure that the two software 'microworlds' are installed and tested on participants' computers before the session** – see the *Resources index* for this module on the DVD or website.

Introductory session	1 hour

- Explore using ICT as a "microworld"
- Reflect on the uses of ICT in your school
- Observe another teacher using ICT
- Plan a lesson using ICT

Into the classroom	1 hour

- Introduce the microworld to the class
- Pupils explore the microworld and generate problems
- Pupils describe what is happening and share problems to explore
- Pupils work on the problems
- Pupils report back and share findings

Follow-up session	1 hour

- Reflect on the *Spirolaterals* or *Dance Moves* lesson
- Explore the use of ICT as a thinking tool: *Magazine Sales*
- Observe a teacher using *Magazine Sales*
- Relate ICT to the new Programme of Study for Mathematics
- Look at the use of ICT in the Case Studies
- Consider using other resources to provoke thinking (optional)

Resources Needed

	Handout 1	Two microworlds to explore
	Software	Spirolaterals 'microworld'
	Software	Dance moves 'microworld'
	Handout 2	Roles of ICT in the maths classroom
	Handout 3	A checklist for using ICT
	Handout 4	Making and selling a magazine
	Handout 5	Spreadsheet hints
	Handout 6	Mathematics Programme of Study: Key stage 3
	Handout 7	Notes on the problems
	Handout 8	Suggested further reading

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| Introduction	Three roles of ICT

In this module we look at three contrasting uses of the computer in mathematics lessons:

- a 'microworld' to explore
- a generic 'thinking tool'
- a didactic tool.

Through planning, implementing and reflecting on lessons using the computer, the role and significance of ICT in mathematics and its relationship to the traditional curriculum are explored.

| Activity 1	Explore using ICT as a "microworld"	15 minutes

In the case studies, the most common use of a computer is as a 'microworld'. We use this term to refer to a dedicated piece of software that presents a real or imaginary situation, such as a scientific experiment, machine or puzzle that pupils are free to explore. The purpose of this activity is to explore one such microworld: *Spirolaterals*. If this context is already familiar to you, you may prefer to explore *Dance moves* instead.
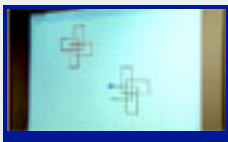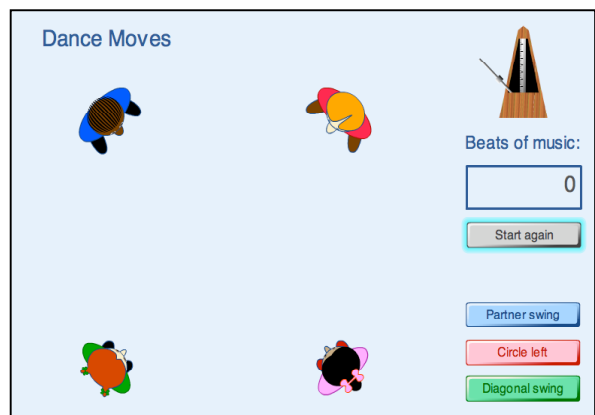
Explore one microworld, referring to the questions on **Handout 1.** Then discuss your experiences:

- What mathematical processes and skills are involved?
- How does the computer contribute to the activity?
- What other "microworld" activities do you make use of in school?

Spirolaterals
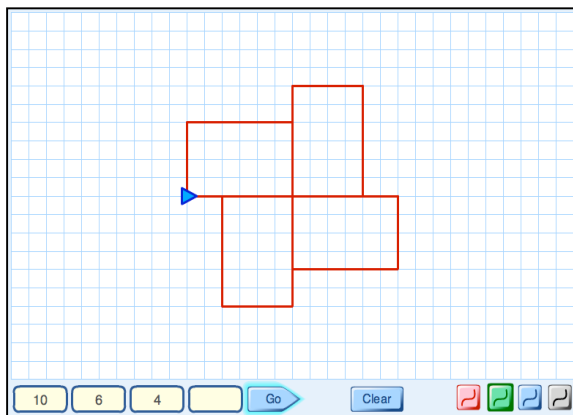
Dance Moves

Activity 2	Reflect on the uses of ICT in your school	10 minutes

📑 **Handout 2** proposes three categories for the roles ICT can play in school mathematics:

- A **microworld** providing a rich, motivating domain to explore
  (e.g. *Spirolaterals*, *Dance Moves* and other specific 'applets')
- A **thinking tool** for working on Mathematics
  (e.g. graphics calculator, spreadsheet, database, graph plotter, dynamic geometry)
- A **didactic tool** that attempts to explain mathematics and develop fluency in routine skills in more motivating ways. (E.g. electronic textbook, *PowerPoint* presentation, computer games to develop fluency with multiplication tables)
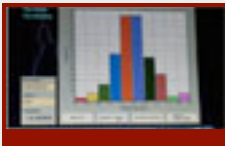
Refer to 📑 **Handout 2** and discuss the following questions:

- Which microworlds, thinking tools, and didactic tools do *you* use in mathematics?
- What relative importance do you give to each of the 3 roles in your lessons?
- How far do your pupils regard ICT as a *natural medium for doing mathematics?*
  (Or is the most powerful mathematical tool still the back of an envelope?)

You may like to watch Rob, Peter and Christine as they discuss the ways they use ICT in their school.

Activity 3	Observe another teacher using ICT	20 minutes

Now watch Rob using *Spirolaterals* with his class.

- How does the teacher help pupils engage with the situation?
- What resources other than computers are made available to pupils?
  How are these used?
- What problems do the pupils create?
- How does the teacher encourage pupils to stop 'playing' and start thinking?
- What potential can you see for developing mathematics in this lesson?

Later, you may also like to watch Christine as she uses the software *Dance moves.*

Activity 4	Plan a lesson using ICT	15 minutes

Now it's your turn to plan a lesson using *Spirolaterals* or *Dance Moves*.

Discuss your answers to the following questions

- What is the best way to introduce the activity to pupils?
- How will you ensure that pupils progress from "playing around" to working systematically and recording their thinking?
- When and how will you enable pupils to share their ideas and strategies?

On **Handout 3**, you will find some more general suggestions and advice on planning lessons which use ICT.

This is the end of the *Introductory session*. After you have tried out your lesson with your own pupils, return for the *Follow-up session*.

Resources to support the lessons, and suggested lesson plans, can be found in the *Into the classroom* session.