

# The use of ICT (spreadsheets) in mathematics in KS2 and KS3

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NCETM

# In the beginning ...

NCETM pathfinders was noticed ...

ICT ✓ ... KS2/3 ✓ ... CPD ✓

A meeting

John/Tony/Rich had worked together ...

Tony/Rich invited others

# The pre-proposal meeting

We were excited ... half way through we were arguing about: 'ICT' or 'maths' or 'maths with ICT' or 'ICT with maths'; what software/hardware; KS2/3 transition?

Then Peter said “I want this to help my pupils' maths in the time that they are in my school”

We rallied to this: focus – maths; transition - not an issue

As for software/hardware, we settled on spreadsheets because they are already in school, have 'obvious' maths applications

AIM To investigate teachers' use of ICT (spreadsheets) to enhance pupils' mathematics subject knowledge in KS2 and KS3

# Dimensions

- a. To encourage cross-school/phase teacher collaboration with regard to the use of ICT in mathematics in KS2 and KS3.
- b. To investigate teachers' foci in the use of ICT in mathematics in KS2 and KS3.
- c. To investigate curricula opportunities and constraints with regard to the use of ICT in mathematics in KS2 and KS3.
- d. To investigate issues concerning ICT-mathematics task design in KS2 and KS3.
- e. To investigate student engagement with mathematics in ICT-mathematics tasks in KS2 and KS3 and aspects of their understanding of mathematics.
- f. To facilitate within-school continued professional development through focused reflections on task design and lesson observations.

# The structure

Thought ... small ... networks ... **TRIADS!**

primary – primary – secondary (Leeds)

primary – primary – secondary (Harrogate)

The Harrogate triad today

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- We wanted to start with the end in mind
- Demonstrate what the children did in our project by playing 'Can't Cook won't cook'
- Review what we did and what we found out
- What lessons might there be for future teaching practice
- Leeds University

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## What We Did

- Initial planning meetings – March 2007
- Harrogate triad brainstorm possible ideas for using maths and ICT
- Spreadsheets was the main focus of the project
- Idea of 'Dragon's Den'/ 'Apprentice' style activity decided upon to create a sense of purpose to the learning
- Other ideas we abandoned were: fantasy football, create a perfect player, school data
- Decided upon designing and making a perfect ice cream, which we could 'launch' to the market.

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## What We Did

- We provided the children with data to support their design of ice cream
- Pilot lesson Year 9 to study the feasibility of making and designing the ice cream
- Although the concept of 'The Apprentice' was retained, ice cream manufacture was deleted in favour of making a perfect pizza.
- Project assembly commenced: the use of spreadsheets was amended to include data handling, data analysis.
- The children were given an extensive set of data organised into 4 criteria: taste, appeal, healthiness and value for money.
- Later an additional criteria of profit was introduced
- First lesson was carried out with St. Aidans year 7 children, followed by year 5 and 6 from Woodlands and Killinghall.

- **Video extracts from both classes**

NB not available on this version of the slide show

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## What We Did

- Year 7 children analysed raw data, developed graphs etc and developed a presentation to submit to an 'Apprentice' style board on their perfect pizza
- The process was evaluated and revised for KS2 (year 5 & 6) children where the task was repeated and culminated in the production of 30 pizzas. The pizzas were assessed by real customers against the 4 criteria
- In January 2008 the winning group from each school reconvened for the 'Apprentice Grand Final'
- We would now like to share with you a 'flavour' of the children's presentations by playing some audio of their conversations

- Rolling pictures and audio of children's presentation

NB not available on this version of the slide show

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## Aims and how they were met

- To encourage cross school and cross phase teacher collaboration with regard to the use of ICT in maths in KS2/3
- To investigate teachers foci in the use of ICT in maths in KS2/3
- To investigate curricular opportunities and constraints with regard with the use of ICT in maths in KS 2/3
- To investigate issues concerning ICT and maths task design in KS2/3
- To investigate student engagement with maths in ICT maths tasks in KS2/ 3 and aspects of their understanding of maths
- To facilitate teacher CPD through focussed reflections on task design and lesson observations

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## Aims and how they were met

- Balancing Continual Professional Development with the children's learning outcomes
- Meeting the aims was organic
- Cyclical process of: planning, teaching, observing and evaluating
- Trial Year 9 lesson evaluated – adapted strategy for cross phase
- Year 7 evaluation – observations and fine tuning for KS2 children
- CPD implications
- ICT and maths implications

# NCETM Presentation

## Aims and how they were met

- To encourage cross school and cross phase teacher collaboration with regard to the use of ICT in maths in KS2/3
- To investigate teachers foci in the use of ICT in maths in KS2/3
- To investigate curricular opportunities and constraints with regard with the use of ICT in maths in KS 2/3
- To investigate issues concerning ICT and maths task design in KS2/3
- To investigate student engagement with maths in ICT maths tasks in KS2/ 3 and aspects of their understanding of maths
- **To facilitate teacher CPD through focussed reflections on task design and lesson observations**

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## Aims and how they were met

- **Our Overall Aim: To investigate teachers' use of ICT (spreadsheets) to enhance pupils' maths subject knowledge in KS2 and KS3**
- **Pupils' progress in maths**

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## Strategies for the future – How might we use this project in other classrooms?

- Links between schools (KS2/3) and University
- Pupils using ICT for a real purpose – engagement without worry!
- Pupils using maths and ICT in a ‘cross curricular’ situation. Children learned by ‘doing’ (visual aids, using Excel, graphs, Powerpoint presentations, presenting, group discussion, persuasive arguments, cooking)
- Year 10 and 12 were able to add this to their own CV (D of E and UCAS)
- Fun and exciting (KS2 children going to “big school”)
- Not just a series of lessons – team effort
- Team momentum established and a desire to continue this with new and alternative projects.

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## Strategies for the future – What issues might other schools encounter?

- Setting up a similar idea requires time and liaison with other schools to work effectively (supply cover and after school meetings)
- Transferability – similar team with similar levels of commitment and enthusiasm
- Cross phase difficulties – children have different knowledge skill sets (KS2 flexibility vs KS 3 specialism)
- Support from Year 10 and 12 both for using and interpreting the data, and facilitating group dynamics – was developed as the project progressed
- Clueless at start – aims developed

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## Our Personal Observations

- Issues we felt were important

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## Summary

- Was the project ICT with maths or maths with ICT.....?
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# Summing up

## Trialogical learning

I was recently reading about ‘trialogical learning’. Trialogical learning was contrasted with monological learning (knowledge acquisition of a lone learner) and dialogical learning (participation, social dialogue). Trialogical learning was described as ‘knowledge creation’ of individuals in a knowledge community with ‘shared space’ and with the aim of developing shared objects. As I read this I kept thinking “pizzas” because I kept thinking “this is what Peter, Richard and Tony were doing”. The next slide list some characteristics of trialogical learning – see if you agree with me.

# Characteristics of dialogical learning

- Focus on shared objects of activity which are developed collaboratively
- Knowledge-creation processes taking place in mediated interaction between individual and collective activities ...
- Cross-fertilization of knowledge practices between communities
- Technology mediation ... novel collaborative technologies provide affordances that make dialogical learning processes accessible
- Development through interaction ... and transformation between tacit knowledge, knowledge practices, and conceptualizations

# On CPD

CPD is so ... important  
hard to pin down

A 'sideways' thought ...

Wartofsky's 3 levels of artefacts:

1. primary artefacts – hammers, textbooks
2. ways of using primary artefacts

Co-ordinated systems of artefacts (not lone)

'Ways of using' artefacts – 'on-line' practice

## On CPD continued

3. “a domain in which there is free construction in the imagination of rules and operations different from those adopted for ordinary [practice]”

Level 3 is ‘off-line’ but arises from level 2 ‘on-line’ practice.

CPD is clearly CPD when it constructs level 3 artefacts.

These three guys went off-line and constructed a trialogic artefact.

# The future

To continue ...

to set up pupil, teacher and school  
connectivity

THANK YOU