



**Teacher *Mediation* of Subject
Learning with ICT:
a *MultiMedia* Approach**

 UNIVERSITY OF
CAMBRIDGE
Faculty of Education

Toolkit for supporting CPD with the T-MEDIA Digital Video Mathematics Resource

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Part 1. Introduction to the T-MEDIA Toolkit

Aims and scope of the multimedia resource

This resource is intended to help secondary school teachers explore how projection technology can potentially be exploited to enhance students' construction of mathematical knowledge. It presents a video case study designed to stimulate and extend teachers' own thinking about when and how they might use projection technology in their own classrooms. It does **not** offer a "model of best practice", nor does it provide any technical training.

The resource is freely available on-line through the NCETM website. It can also be ordered on CD-ROM at cost price at: <http://www.educ.cam.ac.uk/research/projects/istl/>

Further information about the technical requirements to run the resource can be found at the end of the toolkit.

Materials were developed in collaboration with teachers. They offer opportunities for viewers to:

- **See examples of ICT use** in real classroom contexts and **debate issues arising** with colleagues
- Think about effective **alternative approaches**
- Access **examples of teaching resources** which they may wish to try out in the classroom.

The resource can be used flexibly by individuals, groups of colleagues or teachers educators/advisors working with trainees/experienced practitioners.

Further details about the aims and uses, and scope and limitations, can be found under '**Introductions**' in the drop-down menu on the disc.

Aim of the Toolkit

The toolkit is designed to help users of the resource understand quickly what it offers and how they might use it to support professional development; it can shortcut the process of exploring in detail for themselves. While the resource does not attempt to prescribe a particular route through lessons or style of teaching, this toolkit offers some **suggested pathways through the resource** that some teachers have found useful during our trials.

The multimedia materials

The materials consist of a series of video clips of a teacher using different projection technologies as part of her normal Year 8 teaching programme (focusing on straight line graphs). These materials form a basis for teachers to reflect and debate. To inform discussion, each clip (see also '**Clip Units**' under '**Introduction**' in the drop-down menu) is accompanied on screen by:

- Clip introduction;
- Summary of video;
- Slides used within the session;
- Resources used in the lesson;
- Teacher commentary;
- Researcher and specialist comments;
- Alternative approaches;
- Issues for discussion prompts; and
- Reflections facility to record and share thoughts with others.

Further contextual information can be accessed under '**Lessons**' in the drop-down menu or through the **Disc Overview** diagram. This includes data about the school; the class profile; the module background; the class layout; the sequence of lessons; and the lesson aims and outlines. In addition, a **Glossary** of terms that teachers may find helpful in their discussions and a reference list for those who wish to read further, can be accessed under '**Resources**'.

The clips have been arranged on the disc so that they can be approached in three different ways:

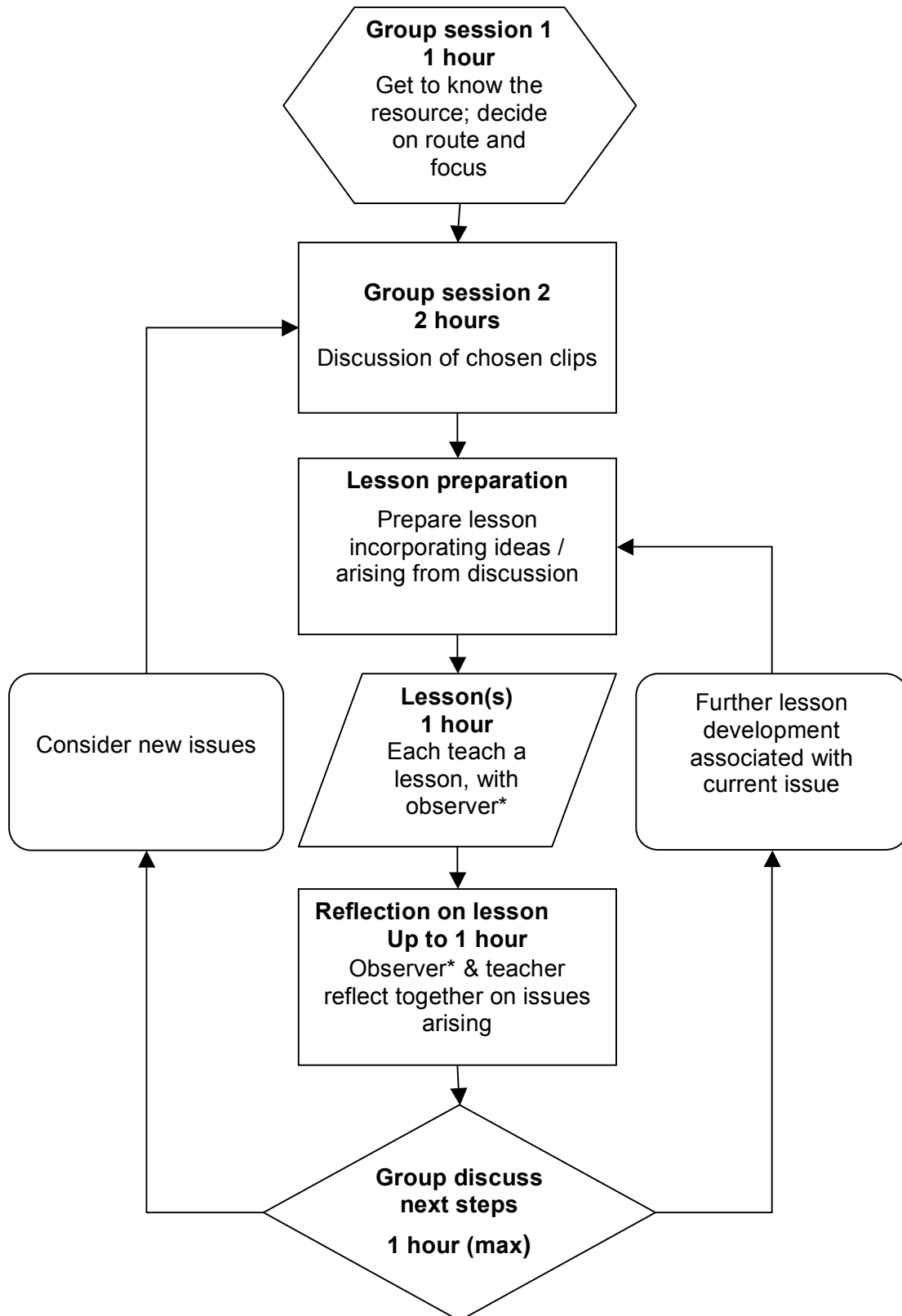
1. Via '**THEMES EMERGING**', that is: by considering various strategies that underpin teaching in these lessons;
2. Via '**TECHNOLOGIES**', considering the use of Autograph, spreadsheets, on-line tutorials or on-line games;
3. Via '**LESSONS AND VIDEOS**' – chronologically or selectively according to the viewer's interest in clip content.

The disc can be navigated via the drop-down menu, or in a more limited way, via the '**Disc overview**' diagram. Further information and an audio **Tour of the Disc** can be accessed under '**Introductions**'.

Using the T-MEDIA resource

There are many alternative ways of using this resource, all of which involve INSET *by* teachers, rather than *on* teachers. The flow diagram and notes overleaf are a suggestion of how teachers might proceed.

Part 2. Suggestions for how to use the Toolkit



* After the initial 'round' of observed lessons, teachers could choose not to be observed in further development phases, and instead discuss their own observations with colleagues.

Group Session 1:

Suggested time: 1 hour (then time for reflection and familiarisation before Session 2)

The aim of this session is to introduce everyone to the T-MEDIA multimedia resource. In particular to look at:

- The content (lesson clips, issues for discussion, facility for recording reflections, further information about the students or lesson and alternative lesson ideas);
- Ways to navigate (using drop-down lefthand menu, disc overviews and map, and the use of the BACK arrow found at the bottom of pages); and
- Routes through the material: via selected (a) 'THEMES', (b) 'TECHNOLOGIES' or (c) 'LESSONS' (chronologically or according to content)

The group will ideally begin by viewing the 6-minute **Tour of the Disc** video with voiceover which briefly demonstrates all of the above. They might then like to practise navigating through the resource, beginning with the **Introductions** screens.

Next the group will need to decide which route they would like to use to explore the content of the T-MEDIA resource, and begin to think about a useful focus within a route.

Sample routes through the T-MEDIA resource:

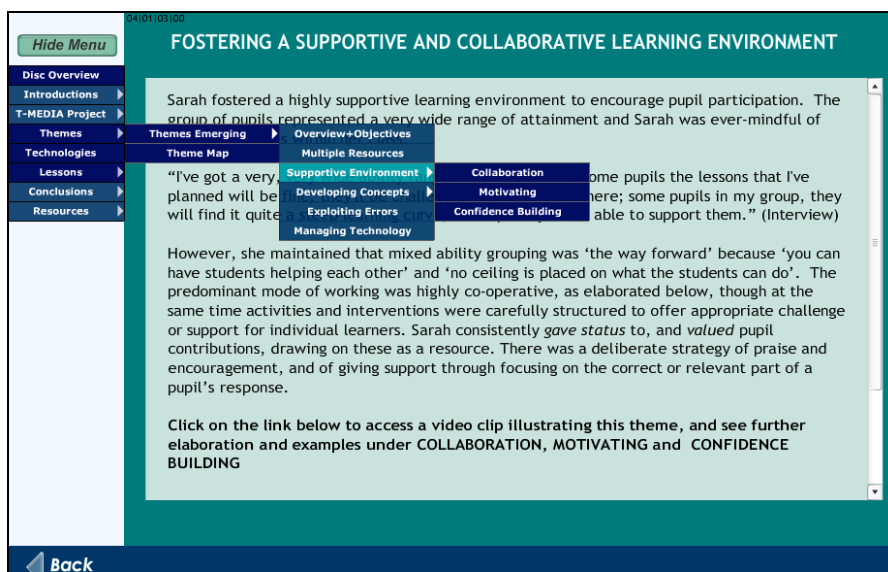
Three sample routes are provided (see the T-MEDIA [Resource Screen List](#) showing how to follow these, or click through a route of your own choice by exploring sections of the resource directly). Sample routes are marked in the screen list with the following symbols:

Theme route ●

Technologies route ☐

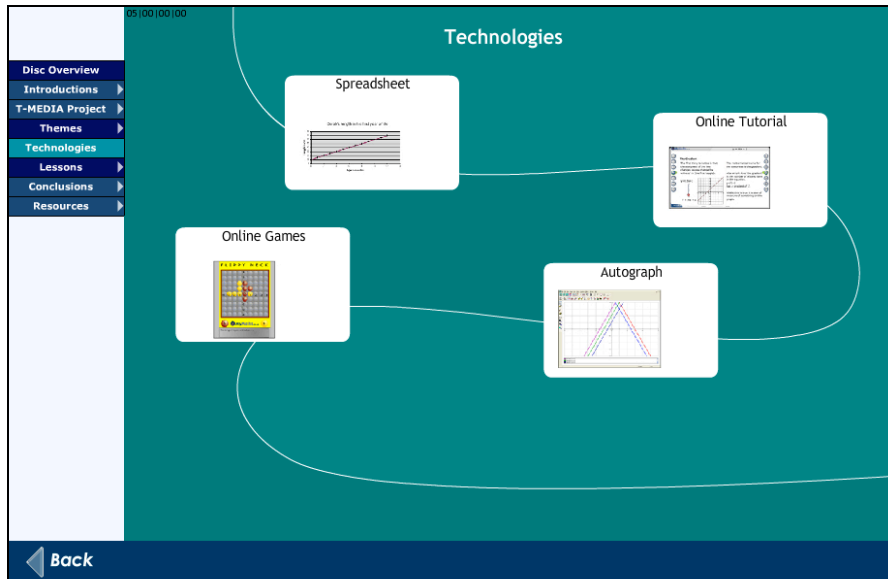
Lesson route ◀

(a) ● **THEMES:** eg *Fostering a supportive learning environment* with sub-themes of *confidence building, collaboration, motivation*.



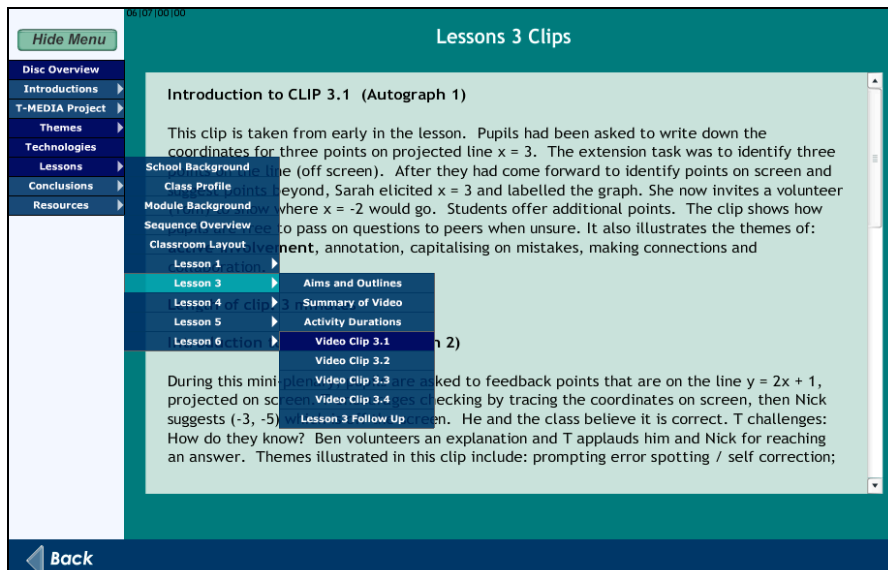
Issues discussed here by other departments include encouraging pupil participation through game playing (plotting co-ordinates in Connect 5), balancing individual support with progressing class as a whole (Clip 1.1).

(b) **TECHNOLOGIES:** eg *Autograph* – in pairs on *laptops* vs. projected to *whole class*



Would an interactive whiteboard 'add value' (Clip 6.3)? Would squared paper on an IWB actually have made use of Autograph irrelevant? (Clip 3.1) What is the appropriate timing of a hands-on exploratory activity (Clip 3.4)?

(c) **LESSONS:** e.g. Clip 3.1: Pupils asked to identify 3 off-screen points on the line $x=3$.



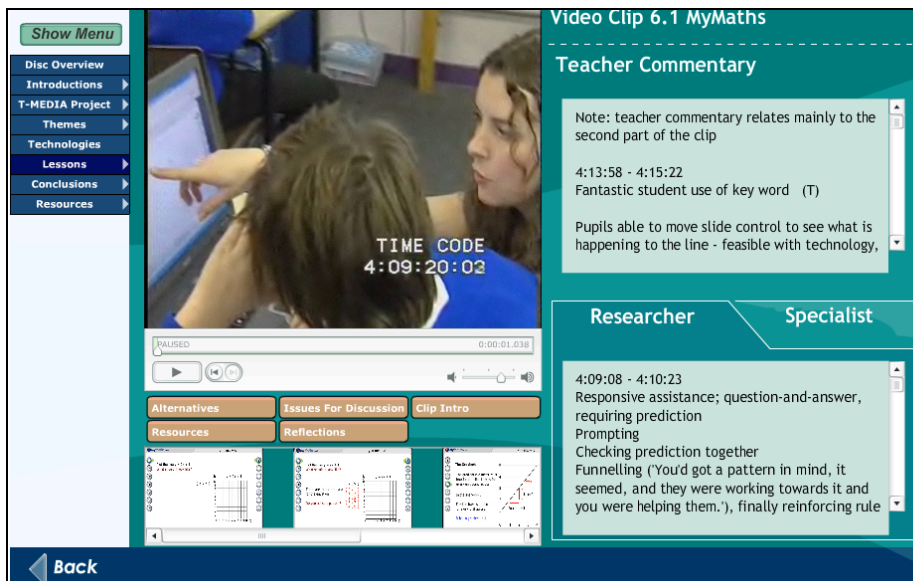
Developing ideas using funnelling questions can be helpful, but could the teacher use pupils to model ideas instead? How can a teacher create that environment where it is OK to get things wrong in front of the class?

Group Session 2:

Suggested time: 2 hours, ideally split into two with time for reflection between

The aim of this session is to use the clips associated with the chosen focus as stimuli for reflection and discussion within the group. Note that the clips are **not** intended to be used as 'model' lessons to be copied. In particular, for each clip, the group might:

- Look at the introduction to the clip
- View the clip and associated commentary
- Use the 'Issues for discussion', 'Reflections' and 'Alternatives' as prompts for debate
- Consider how emerging ideas might impact on own practice
- Refine the focus for development or exploration



After this session, group members could each prepare a lesson incorporating these ideas.

- (a) **THEMES:** eg *Fostering a supportive learning environment*. A shared focus of lesson planning in one department was *collaboration and motivation*, focusing on increasing participation of reticent girls.
- (b) **TECHNOLOGIES:** eg *Online Games* (Clip 6.1) One teacher used “MyMaths” for the first time with pupils working individually “to improve their motivation and to work at their own pace” – with mixed success.
- (c) **LESSONS:** (Clips 5.1, 5.2) One teacher with a traditional transmission approach wanted his pupils to come up and work at the board and to “produce the mathematics for themselves through pairwork and discussion”, a radical change in his approach.

Lesson(s):

Teachers may wish to work in pairs, each person preparing and teaching one lesson and observing their partner’s lesson, or as a group, teaching one lesson and observing a lesson prepared by each member of the group, or by one other member.

Teachers may also wish to consider alternative strategies that could be employed should the desired technology be unexpectedly unavailable. Downloadable resources and programme files are available in folders in the main file directory of the CD, and through the website.

Reflection on the observed lesson:

Suggested time: 1 hour

This is an opportunity for both teacher and observer to:

- reflect together on what they have seen from their different vantage points concerning the issue chosen in session 1 and the change in practice;
- provide alternative understandings of relevant incidents; ask constructive questions such as: Was the type of technology / pedagogical approach used appropriate for this particular group and the teacher's objectives? Are there any ways in which the technology could be exploited more fully next time? How responsive, engaged and motivated were the learners in this lesson?; and
- consider what might be transferable to other lessons or better taught differently.

Following this round of observed lessons, teachers may wish to continue working (with or without observers) on refining their ideas, meeting together on a regular basis to reflect on their learning and sharing experiences or may collectively decide to look at a new 'issue', returning to a 'session 2' type activity.

Trial school teachers' suggestions for embedding reflective practice:

Finding time/getting support

- Use department time on an INSET day to do the first/second session
- Set aside a regular slot in department meetings, perhaps with some stimulus material, to encourage teachers' ongoing reflection on their teaching
- Use existing formal peer observation mechanisms in the school or create them to cover time away from one's own lessons to observe colleagues
- Make 'innovation of practice through reflection' a performance management target.

Spreading knowledge

- Share lesson resources with colleagues
- Share lesson experiences with colleagues
- Cascading: If the group using the T-MEDIA resource was a sub-group of the department, set up differently constituted groups, led by one of the original group members, sharing initial experiences about what worked and what did not, and possibly collectively choosing to travel an alternative 'route' through the resource.

T-MEDIA project

The T-MEDIA project was a product of collaboration between members of Cambridge University Faculty of Education and Linton Village College (a co-educational comprehensive school with 800+ students aged 11-16). Details of the underlying concepts, methods, analysis and outcomes can be found on the resource under '**T- MEDIA Project**'.

Technical requirements

The resource runs on Apple Macintosh or Windows computers: Mac OSX v.10.1.x or above, or Windows 98 or above.

Adobe Flash Player 9 must be installed before running the online version of the resource or playing the discs (free download from <http://www.adobe.com/go/getflashplayer>)

T-MEDIA discs

For optimal performance, disc contents should be copied into, and run from, the machine's hard drive.

Troubleshooting

A guide to troubleshooting technical problems can be found in a folder on the main file directory of the CD-ROM, and on the portal.

Part 3. T-MEDIA Resource Screen List with Suggested Routes

‘Looking at mathematics teaching and learning with projection technology: a resource to support reflection on classroom practice’	
Includes 3 sample starter routes: follow the symbols below to access materials relating to one strand in each route. Background information under T-MEDIA PROJECT and LESSONS can of course be accessed at any point as desired.	
Theme route ●	Technologies route ◻
	Lesson route ◀
DISC OVERVIEW	● ◻ ▶
INTRODUCTIONS	● ◻ ▶
Title page	
About the resource	● ◻ ▶
Aims	● ◻ ▶
Scope and limitations	● ◻ ▶
Clip units	● ◻ ▶
Disc navigation	● ◻ ▶
Tour of the disc (START HERE!)	● ◻ ▶
T-MEDIA PROJECT	
About T-Media	
Aims	
People	
<i>Teacher</i>	
<i>Colleague</i>	
<i>Teacher selection</i>	
<i>Researcher 1</i>	
<i>Researcher 2</i>	
<i>Project secretary</i>	
<i>Subject specialist 1</i>	
<i>Subject specialist 2</i>	
<i>Multimedia support</i>	
Research collaboration	
Methods	
Video review	
<i>Grid example</i>	
Outcomes	
Audience	
Contact us	
Acknowledgements	

THEMES	●
Themes emerging	●
<i>Overview & objectives</i>	
<i>Multiple resources</i>	
Supportive environment	●
<i>Collaborating</i>	●
<i>Motivating</i>	●
<i>Confidence building</i>	●
Developing concepts	
<i>Scaffolding & Fading</i>	
<i>Intertwining Resources</i>	
<i>Making Connections</i>	
<i>Using Keywords</i>	
<i>Transferable Skills</i>	
Exploiting Errors	
Managing Technology	
Theme Map	
TECHNOLOGIES	◻
Online games	
Spreadsheets	
Autograph	◻
Online tutorials	
LESSONS	◀
School background	
Class Profile	
Module background	
Sequence Overview	◀
Classroom Layout	
Lesson 1	
<i>Aims & Outlines (includes non-videoed L2)</i>	
<i>Summary of video (covers whole lesson)</i>	
<i>Activity durations chart</i>	
<i>Classroom layout</i>	
Clip 1.1 Connect 5	●
• Alternatives	●
• Issues for discussion	●
• Clip Intro	●
• Resources	
• Reflections (opens Word document)	●

T-MEDIA Toolkit

• Slides	
Clip 1.2 Spreadsheet	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Clip 1.3 Growthchart	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Lesson 1 Follow up	
• <i>Added Value</i>	
• <i>Alternatives</i>	
• <i>Evidence for Learning</i>	
• <i>Resources</i>	
Lesson 3	◀
Aims, summary of lesson video etc	◀
Clip 3.1 Autograph 1	🔵 ▶
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	🔵 ▶
Clip 3.2 Autograph 2	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Clip 3.3 Autograph 3	◀
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	◀
Clip 3.4 Autograph 4 with laptops	🔵
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	🔵
Lesson 3 Follow up	◀
<i>Added value, Alternatives, Evidence for Learning, Resources</i>	◀
Lesson 4	
Aims, summary of lesson video etc	
Clip 4.1 Autograph 6	●
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	●
Lesson 4 Follow up	
<i>Added value, Alternatives, Evidence for Learning, Resources</i>	
Lesson 5	
Aims, summary of lesson video etc	
Clip 5.1 Card sort	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Clip 5.2 Table of values	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	

T-MEDIA Toolkit

Lesson 5 Follow up	
<i>Added value, Alternatives, Evidence for Learning, Resources</i>	
Lesson 6	
Aims, summary of lesson video etc	
Clip 6.1 MyMaths	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Clip 6.2 Autograph investigation	
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	
Clip 6.3 Plenary	● ◻
Alternatives, Issues for discussion, Clip intro, Resources, Reflections, Slides	● ◻
Lesson 6 Follow up	
<i>Added value, Alternatives, Evidence for Learning, Resources</i>	
CONCLUSIONS	
Final comments	
What Next?	
RESOURCES	
References	
Lesson 1 <i>summary of lesson video</i>	
Lesson 2 <i>summary of lesson video</i>	
Lesson 3 <i>summary of lesson video</i>	
Lesson 4 <i>summary of lesson video</i>	
Lesson 5 <i>summary of lesson video</i>	
Lesson 6 <i>summary of lesson video</i>	
Interview prompts	
Glossary	

Part 4. SMT Briefing Sheet

T-MEDIA Digital Resource and Toolkit

Aim of the Toolkit

To support Mathematics departments in using the T-MEDIA Resource to collaborate in reflecting on and developing their own classroom practice with reference to ICT.

Requirements

- A group of 3-4 volunteer teachers willing to participate and to work together
- Support from the Head of Mathematics
- Support from SMT
- **Time** for the teachers to meet (with cover provided where necessary)
- A co-ordinator/facilitator within the group – not necessarily the HoD
- Access to appropriate computer equipment to run the multimedia resource (see technical details with the resource and inform technical staff of hardware/software requirements if necessary)
- (Printed) copies of the Toolkit for each teacher

Overview

After an initial session at which the T-MEDIA resource is introduced, the teachers meet to watch some video clips from the resource and discuss their response to them. There are a number of different pathways that can be used, depending on the identified needs of the group (eg using ICT, whole-class work, scaffolding). The **lesson clips are not presented as 'best practice'** but are recordings from **real lessons** in an ordinary class (containing several children with severe behavioural issues). In the course of the discussion the teachers may decide they like what they have seen or may disagree with the teacher's decisions. To support the discussion there are a number of built-in materials that can be used; these include commentary, questions, prompts and suggested alternatives.

The teachers each plan a lesson as their response to the discussion. This may involve using elements or ideas from the lessons on the resource (perhaps translated to a different topic area) or incorporating alternatives that were discussed by the group. Each of the lessons is observed by at least one member of the group and a feedback discussion takes place.

After all of the lessons have been taught all of the teachers meet again and discuss common themes that arose from the lessons and ways forward for themselves, their colleagues and / or the whole department. In sum this is **"INSET that is done by teachers"** and it is not a one-off intervention, but a **long-term process of professional dialogue**; departments involved in trials emphasised the importance of continuing their discussions into the future.

PTO for Summary of Time Commitments

Structure and Time Requirements

Stage	Suggested Timing	Detail
Familiarisation with toolkit and resource	30 mins (minimum)	Co-ordinator familiarises with materials in preparation for introducing to group
Initial meeting	1 hour total (then time for familiarisation before Session 2)	Introducing the resource, deciding on route and focus and how to approach using the resource
Main discussion session	2 hours total (this may be split into 2 sessions)	Watching clips, carrying out built-in activities, discussing issues and how they could be transferred to the teachers' lessons
Lesson planning		Each teacher works individually to prepare lessons incorporating ideas arising from the discussion
Observing lessons	1 period / teacher	The lessons would last a single period, each teacher would observe a colleague
Feedback with individual teachers	1 period / teacher	A feedback discussion between the teacher and their observer, including discussion of how the approach could be modified / taken forward in light of the lesson experience
Evaluation meeting	Up to 1 hour total	A group meeting to discuss common themes and ways of moving forward within the department

Total time out of lessons required for this initial cycle is dependent on the model adopted by a department, but ideally includes 6 hours cover per participating teacher (7 hours for coordinator).