Institute of Education

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THE USE OF *VIDEO CASES* IN AN ONLINE COURSE: SUPPORTING TEACHERS IN DEVELOPING THEIR RiTPACK

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Digital Technology for Mathematical Learning

There are two e-learning aspects of this Master – level module:

- its online delivery

and

- the e-focus of the module itself, which consists of
  - familiarisation of the participants (almost all with a teaching background) with a wide range of digital tools and resources (graph plotters, DGSs and fully interactive online packages)
  - critical reflection on the implications of using such tools in the learning and teaching of mathematics at secondary school level.

Digital Technology for Mathematical Learning

- The course has a modular structure, with three main themes spread over the 10 weeks: Theme A – **Visualising**; Theme B - **Generalising and Expressing**; Theme C - **Modelling**

- Each week:

  The tutors upload:

  - LOs (learning objectives) and description of week's content
  - Readings (essential and indicative)
  - The weekly tasks, which are tightly structured towards the course aims and learning objectives

  The participants are required:

  - to carry out the weekly tasks, to go online and post and respond to posts (online presence to also account for attendance)

Online learning

- Instead of direct teaching, learning is designed to take place as the result of doing short, manageable tasks.

- Offline tasks included:
  - familiarisation with a piece of software and example problems using specific software
  - design of a maths activity using the specific digital environment
  - trial out the activity with pupils/other learners and reflect on teaching or learning episodes

- Online tasks included:
  - engaging with the ideas in the key readings; for example:
    - read one of the essential reading articles and write a response about the points agreed with and disagreed with from the article
    - contribute to online discussion forums with written observations on views and perspectives of fellow students.
  - applying the ideas encountered in the key readings in a specific learning context;

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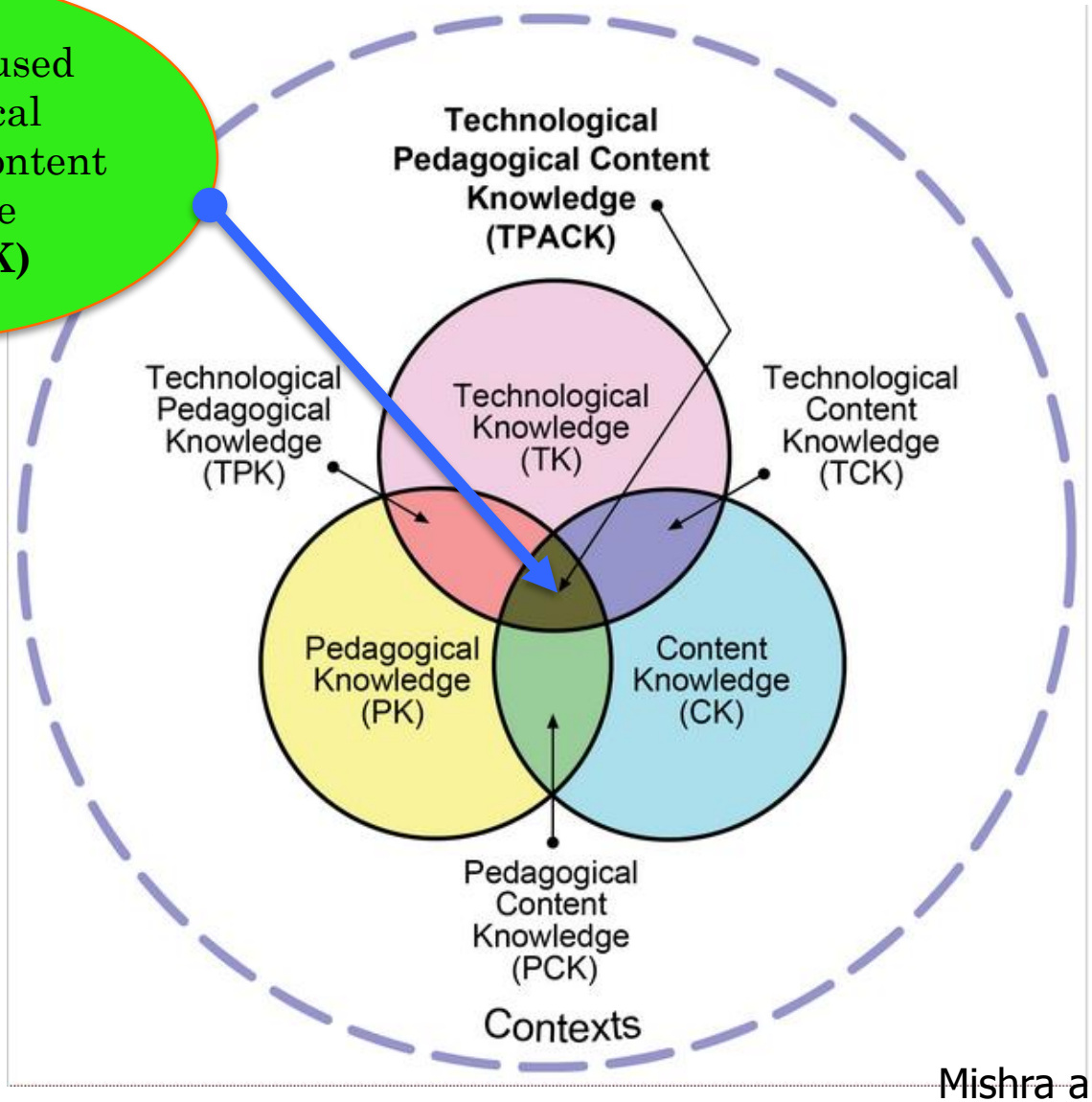
The emerging pedagogies of an online module

- the online pedagogy of us, the tutors, ensuring that online teaching and learning is effective

- the pedagogy of the participants as they started experimenting with using the new technology in their teaching practices and linking it with the research knowledge base of the module **RiTPACK**

Research infused Technological Pedagogical Content Knowledge **(RiTPACK)**



Mishra and Koehler, 2009

Our evaluation of the module after its 1st presentation

Features of the participants online contributions:

- narratives of their own classroom based experiences using the digital technology lacked those details needed to understand and analyse the actual learning taking place;

- the time consuming aspect of trying to understand each other's experience invariably led to less reflection on 'why that happened', and to a lack of engaging with the research (connecting their 'research-based' learning with the particular instances reported - the **Ri** aspect).

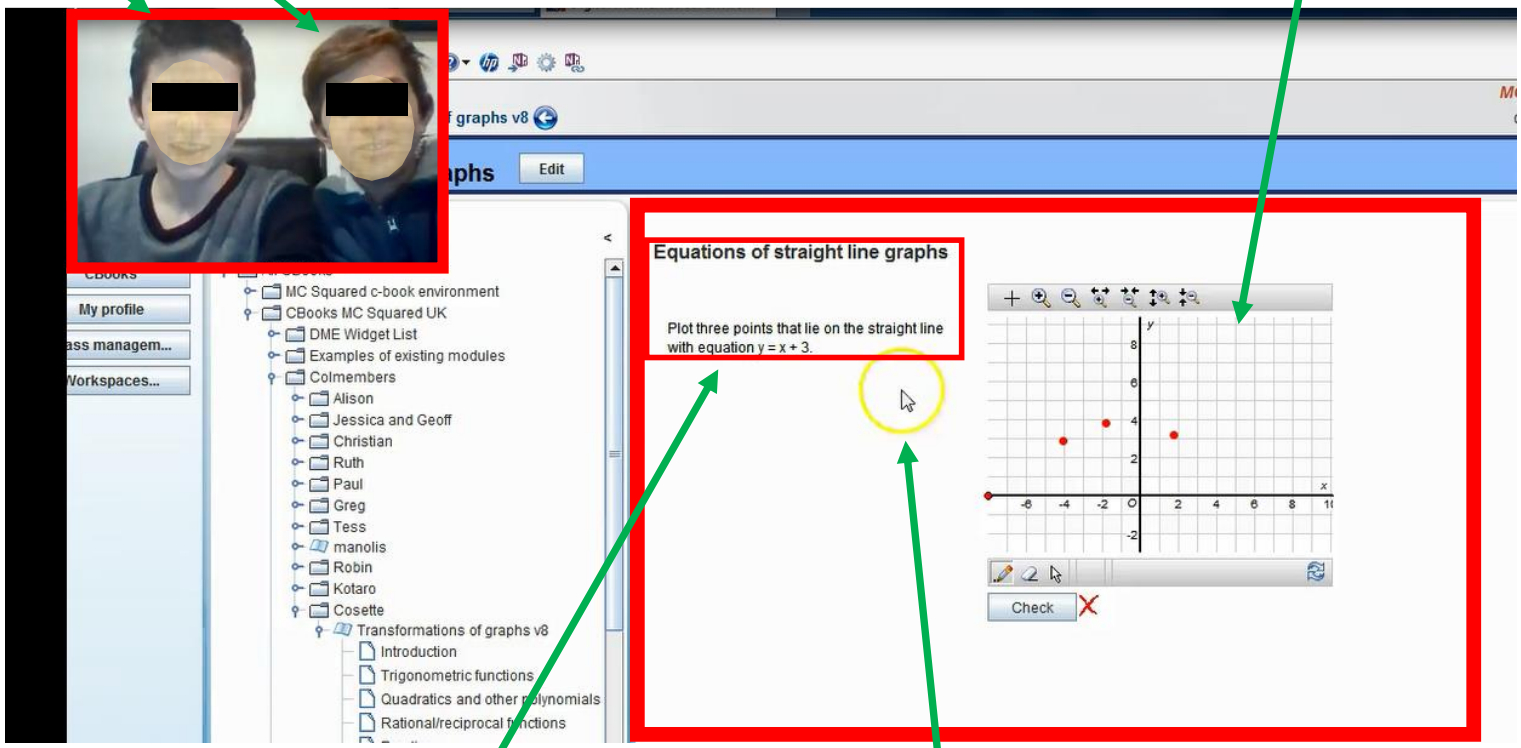
Our team's innovation in the delivery of this module: The video Case

- tutors-produced video cases of learners using digital technology and doing maths;
- captured raw data using screencast video recording software:
  - pupils' screen work while using the digital tool and application to explore a piece of maths
  - the audio recordings of pupils and teacher's utterances and interactions

provide the participants with an opportunity

- to collaborate based on a shared episode, thus making the online discussions more grounded in actual events, more insightful, and more resistant to oversimplifications.

- Below is a screen shot from such a video. The areas of the video screen that you should pay particular attention to are being highlighted and some explanations provided.



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THE VIDEO CASES - HOW USED?

- weekly online task: the participants focussed on a video case as the basis of a shared analysis;
- analysis and interpretation put forward by participants and justified based on own experiences, views and assimilated literature were shared in a forum discussion;
- tutors' **formative feedback** on the quality of analysis and interpretation were made visible to all participants;

Formative feedback:

- In your analysis and interpretation of the learning episodes selected, be consistent in making connections between research & theory reviewed and your observations of the pupils' learning/activities in these videos (and your early experiences of trying out ideas in the classroom, if this applies to you)

- You should use the literature reviewed to support and back up your evaluation of the learning observed in other subject lessons and in your practice.

- Have a look at the interpretation of Tim and Tom's learning episodes shared with you on Moodle; use that as a model for the kind of evidence you need to provide to support claims such as 'they all learned', 'ICT helped', 'pupils understood', etc'

Evaluation of impact of innovation

Data collected:

- The participants' online contributions to analysis and interpretation of the chosen episodes of the video case studies
- The participants' writing for their end of module assignment

Case study approach (The case of Mark provided in the paper)

Tutors' analysis and interpretation provided evidence of **Ri successfully integrated with the participants developing TPACK**

- participants' engagement with ideas from literature to analyse learning
- development of critical reflection skills as reflected in their analysis and evaluation of design, trial and evaluation of a sequence of mathematical activities that exploits the possibilities of digital technologies

The main finding:

- The online video case intervention facilitated the connection between the Ri and TPACK, hence contributing to the **development of teachers as researchers**.

- In his online entry, Mark comments on the importance of and the need for creating *many images to construct relationships that will facilitate visualisation and reasoning. This is where the technology is powerful in facilitating the creation of many images rapidly in order to focus students on the connections between them. Technology is also engaging and provides a change from the "normal".*

- Mark comments on how the feedback received from the dynamic software *exposed* [the boys] *to a misconception when the technology shows them the graph of y=4x* [which] *is different from the graph they are trying to define. Here they are able to quickly alter their incorrect conjecture as a result of timely response from the technology. Additionally, rather than just being told they are wrong and, as a result of the technology showing them the graph of their conjectured function* [the inputted equation] *beside the target function, they see that the coefficient of x is related to the steepness* [of the straight line graph]. *They both alter their conjecture fluidly and add clarity to their visualisation of the situation. Mariottii and Pesci (1994) cited in Elliot (1998) say that visualisation occurs when 'thinking is spontaneously accompanied and supported by images'.*