

# Enhancing formative assessment using digital technology

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## Introduction

### Focus

The research focuses on the **use of iPads** in mathematics lessons and how they can be used to facilitate or enhance **formative assessment**. The lessons designed and observed in this phase all involved some use iPads (or laptops) but with **different software** and mathematical **topics**.

### Research questions

- How do teachers **obtain, process** and **present** formative assessment data from students using digital technology?
- How do teachers **inform and adapt their future teaching** using such data?

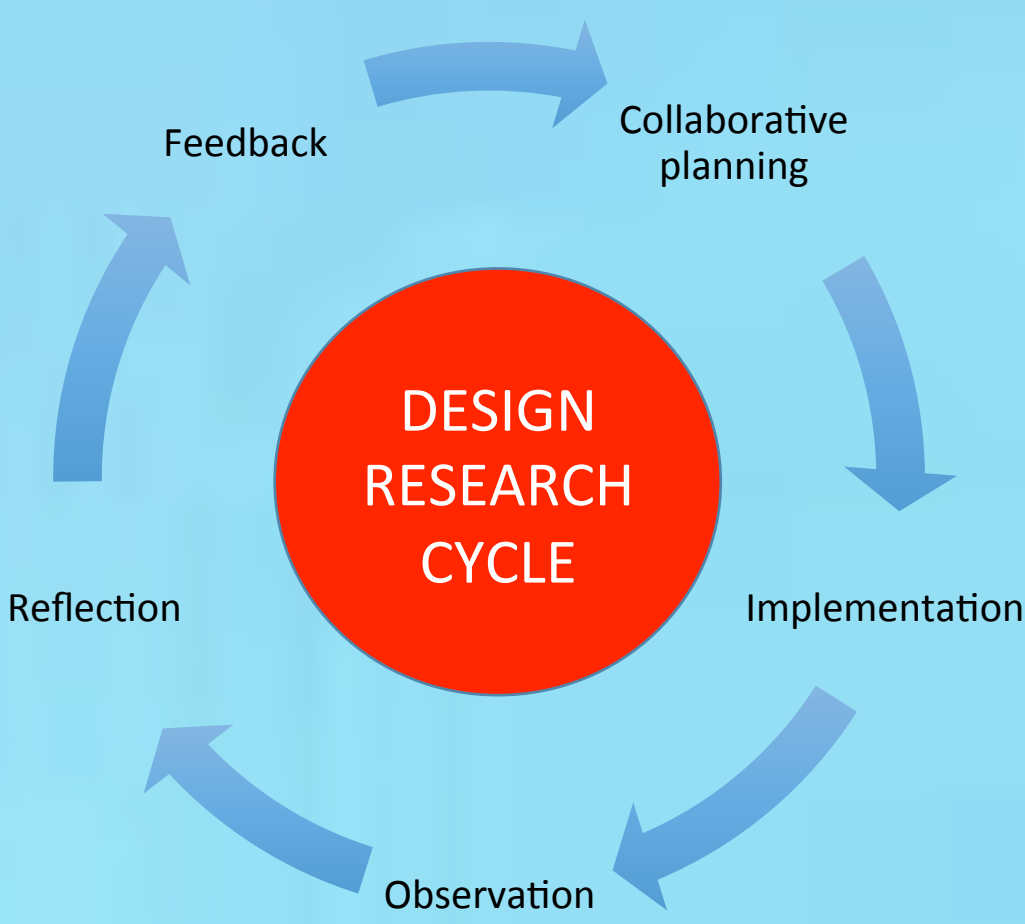
	Where the Learner is Going	Where the Learner is Right Now	How to Get There
Teacher	Clarifying learning intentions and sharing criteria for success	Engineering effective classroom discussions and tasks that elicit evidence of learning	Providing feedback that moves learners forward
Peer	Understanding and sharing learning intentions and criteria for success	Activating students as instructional resources for one another	
Learner		Activating students as the owners of their own learning	

Formative Assessment Framework ((William & Thompson, 2007).

In the use of digital technology in education there are three **interlinked strands** but these are **unequally developed**:

- Technology
- Pedagogy
- System change

(Fullan and Donnelly, 2013)

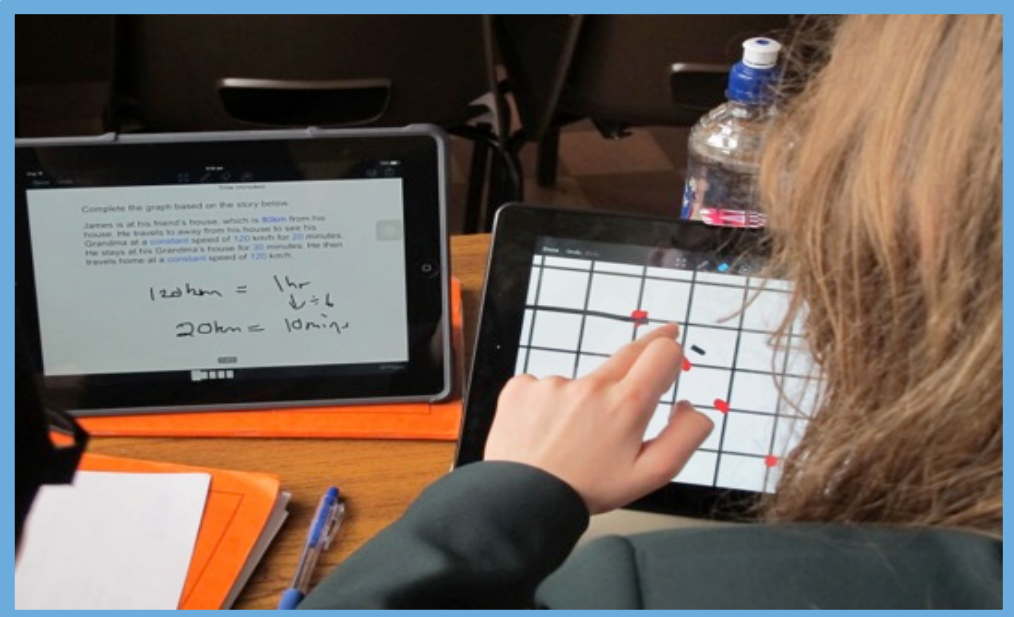


The design research approach involved collaborative work with teachers in a cycle of lesson planning, observation, reflection and feedback into the next lesson.

Practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted and used by teachers, learners, or their peers, to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions they would have taken in the absence of the evidence that was elicited."

(Black & Wiliam, 2009)

The project involved working with three schools and nine teachers to design and trial a total of eight lessons.



## Framework for analysis

Key area	Examples using of digital technology
Building on students' prior knowledge	Pre-lesson diagnostic assessment and class overviews are used in lesson planning.
Identifying and responding to students' conceptual difficulties	Sample student work is selected and displayed to expose misconceptions.
Using questioning	Student work is displayed and students are questioned about their methods.
Increasing student collaboration	Students compare and discuss their work even when working on individual iPads.
Enabling students to become assessors	Peer assessment takes place during class discussion and collaborative work.

## FUNCTIONS OF TECHNOLOGY

SENDING AND DISPLAYING

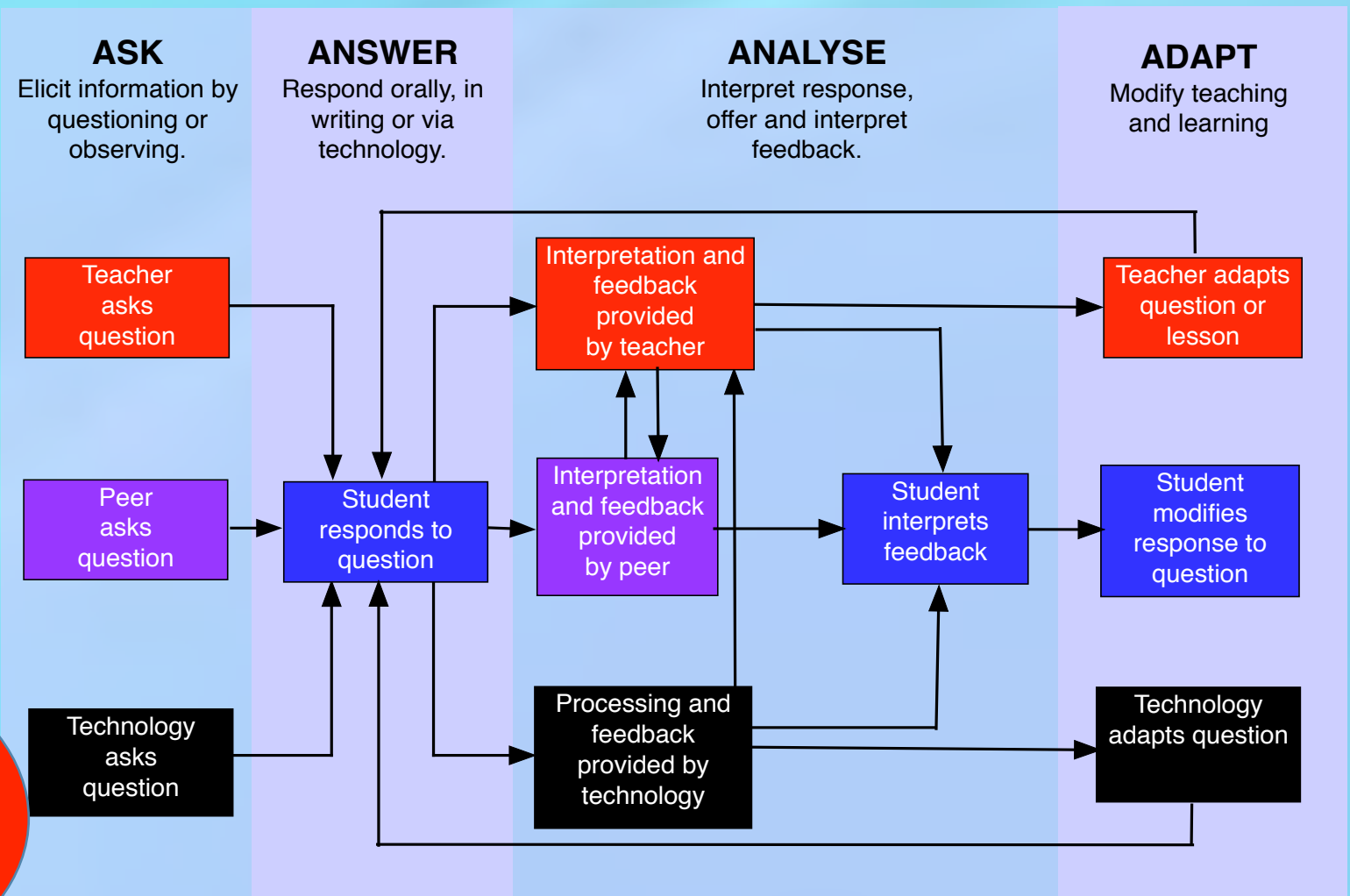
PROCESSING AND ANALYSING

PROVIDING AN INTERACTIVE LEARNING ENVIRONMENT

## KEY FINDINGS

- The speed and accessibility of information can be beneficial.
- The effective use of information provided by digital technology in formative assessment is dependent on appropriate teacher action.
- Pedagogy is important. Teachers need to understand how to interpret and use information.
- Detailed analysis of the process can help highlight key decision points for teachers.
- Using formative assessment processes as a means of examining the impact on learning of digital technology focuses the study of digital technology on areas where positive effects can be expected.

## EFFECTS OF DIGITAL TECHNOLOGY ON FORMATIVE ASSESSMENT PROCESSES



## Digital technology in formative assessment

### Example: Pre-lesson assessment

Summary of use	Examples of apps, systems.	Process	Assessment and response	Comparison to paper-based process
Closed response questions are sent to students to complete and return to the teacher.	For communication: <a href="#">Nearpod</a> <a href="#">Showbie</a>  + for question design: <a href="#">Socrative</a> <a href="#">Mathspace</a>	Teacher gains an overview of students' facility with the content prior to lesson.	Teacher gains some information on student understanding to use in planning the lesson.  Teacher may group students according to results, for example, so that one can help another.	Advantages: Replacement of paper-based methods with benefit of easy access for the teacher. Summary information has benefit of the speed at which this is available to the teacher and time saved.  Drawbacks: Limited number of question formats available on some software.

### References:

Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. Educational Assessment, Evaluation and Accountability, 21(1), 5-31.  
Fullan, M., & Donnelly, K. (2013). Alive in the swamp: Assessing digital innovations in education. London: Nesta. Available online: [www.nesta.org.uk/library/documents/Alive\\_in\\_the\\_Swamp.pdf](http://www.nesta.org.uk/library/documents/Alive_in_the_Swamp.pdf).  
William, D., & Thompson, M. (2007). Integrating assessment with learning: What will it take to make it work?