FaSMEd

The University of Nottingham

UNITED KINGDOM · CHINA · MALAYSIA

Progress with FaSMEd

March 2016

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Project partners

- University of Newcastle, UK
- University of Nottingham, UK
- Ecole Normale Superieure de Lyon, France
- National University of Ireland, Maynooth, Republic of Ireland
- University of Education, Freiburg, Germany
- University of Turin, Italy
- Freudenthal Institute, Holland
- African Institute for Mathematical Sciences, Capetown, South Africa
- Sor-Trondelag University College, Norway

IL CORSO DI NUOTO

Lo scorso anno scolastico, i 90 bambini di una scuola dell'infanzia sono andati al corso di nuoto della piscina comunale.
Avevano a disposizione, come da regolamento, 15 istruttori.
Quest'anno i bambini della stessa scuola sono 30 in più: quanti istruttori avranno a disposizione in piscina? 23 ISTRUTTORI

90+30=120 BAMBINI IN TUTTO L'ANNO DOPO

120 | 15	x | 15
120 | 8	8 | 120
000	

15+8=23 ISTRUTTORI PER 120 BAMBINI

GLI ISTRUTTORI IN PIÙ

Spiega come hai ragionato

ABBIAMO AGGIUNTO AI 90 BAMBINI DELL'ANNO SCORSO, 30 BAMBINI CHE SONO VENUTI AL CORSO DI NUOTO (QUELLI CHE SI SONO AGGIUNTI) EVENIVA 120. POI ABBIAMO DIVISO I BAMBINI PER GLI ISTRUTTORI E VENIVA 8 CHE SONO GLI ISTRUTTORI IN PIÙ. DOPO ABBIAMO FATTO 15 GLI ISTRUTTORI DELL'ANNO SCORSO PIÙ GLI ISTRUTTORI DELL'ANNO DOPO E VENIVA 23 CHE SONO GLI ISTRUTTORI PER 120 BAMBINI.
LA PISCINA AVRÀ A DISPOSIZIONE 8 ISTRUTTORI IN PIÙ.

23

90+30=
120 bambini
in tutto

120:15=?

8 istruttori
~~in più~~.

8+15=23

20

1° STRATEGIA

90:15=6 bambini
per ogni istruttore

30:6=5 istruttori
nuovi (in più)

15+5=20 istruttori
di quest'anno

20

2° STRATEGIA

90+30=120
bambini di questo
anno

90:15=6 bambini per
ogni istruttore

120:6=20 istruttori
di quest'anno

20

3° STRATEGIA

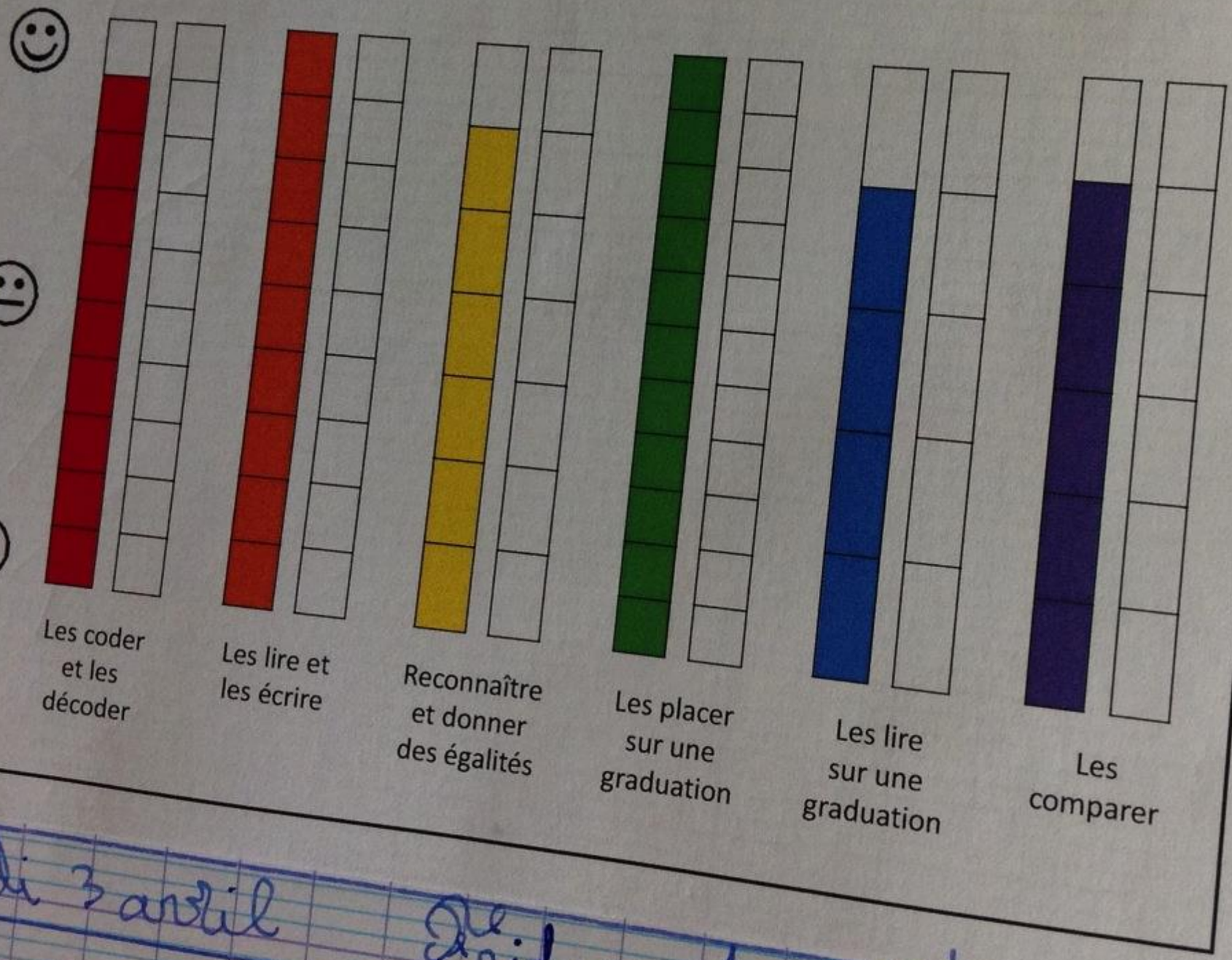
90 + 30 in più
30 30 30

15 ISTR + 5 IST
5 5 5

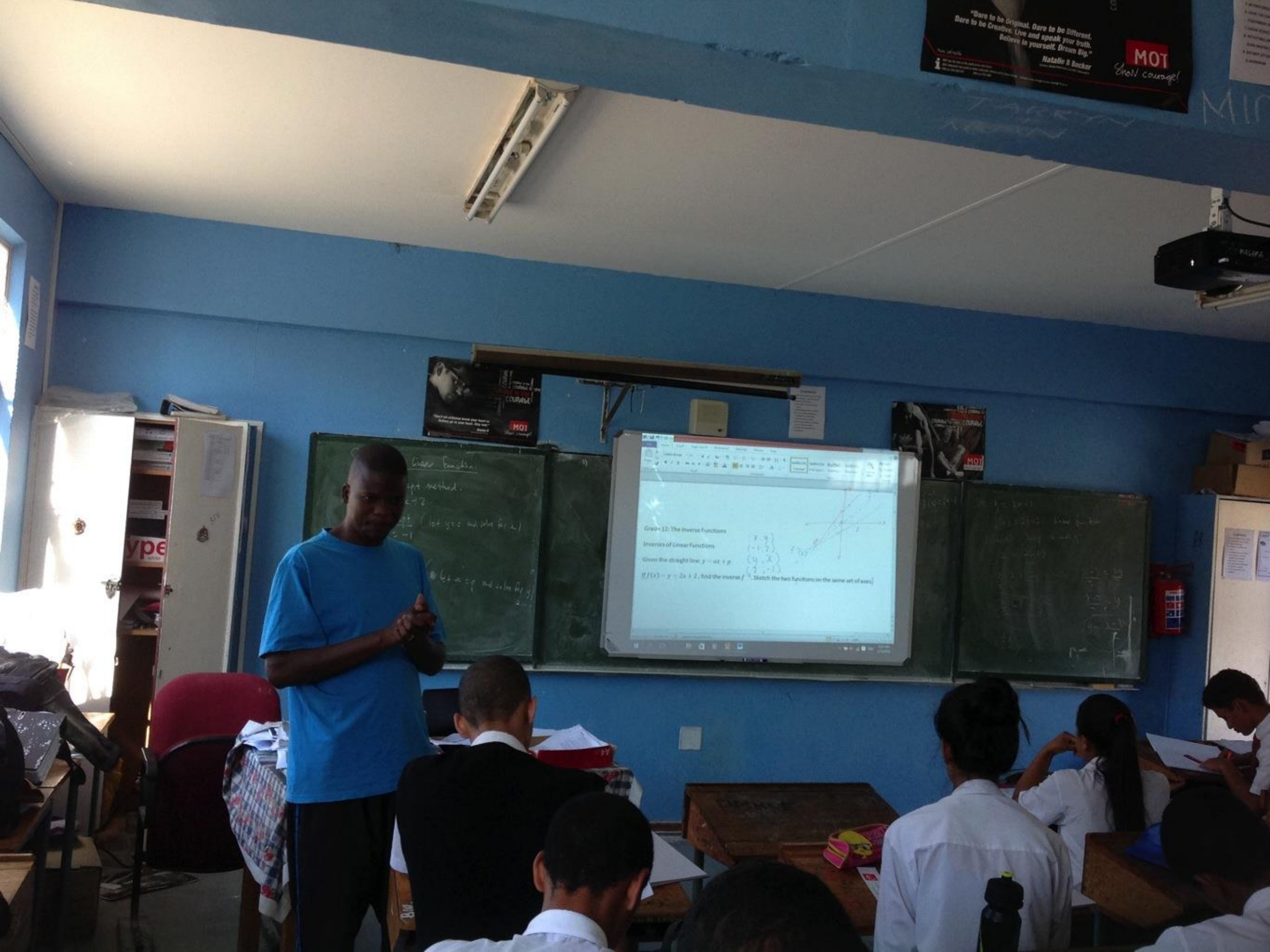

Problème 1 : Sophie a mesuré l'épaisseur d'une pile de 5 revues identiques. Elle a trouvé 2 cm.
Quelle serait l'épaisseur d'une pile de 10 revues ?
PAUSE
janvier
février
mars
avril
mai
juin
juillet
août
septembre
octobre
novembre
décembre
Thursday

Nom: Camil Achache

QU'EST-CE QUE JE SAIS FAIRE AVEC LES FRACTIONS?



Vendredi 3 avril Friday, April 3rd 2015


"Dare to be Original. Dare to be Different.
Dare to be Creative. Live and speak your truth.
Believe in yourself. Dream Big."
Natalie B Becker
MOI
Show courage!
Grade 12: The Inverse Functions
Inverses of Linear Functions
Given the straight line: $y = ax + p$
If $f(x) = y = 2x + 2$, find the inverse f^{-1}. Sketch the two functions on the same set of axes.

s is Next
ness!!

Book Assessment	Total 5 Marks
1. Handwriting	
2. Dates + Heading	
3. Illustrations	
4. TB+NB covered	
5. Use of ruler/pen	
Due Date:	24.2.2016

Research questions

- How do teachers **process** formative assessment data from students using a range of technologies?

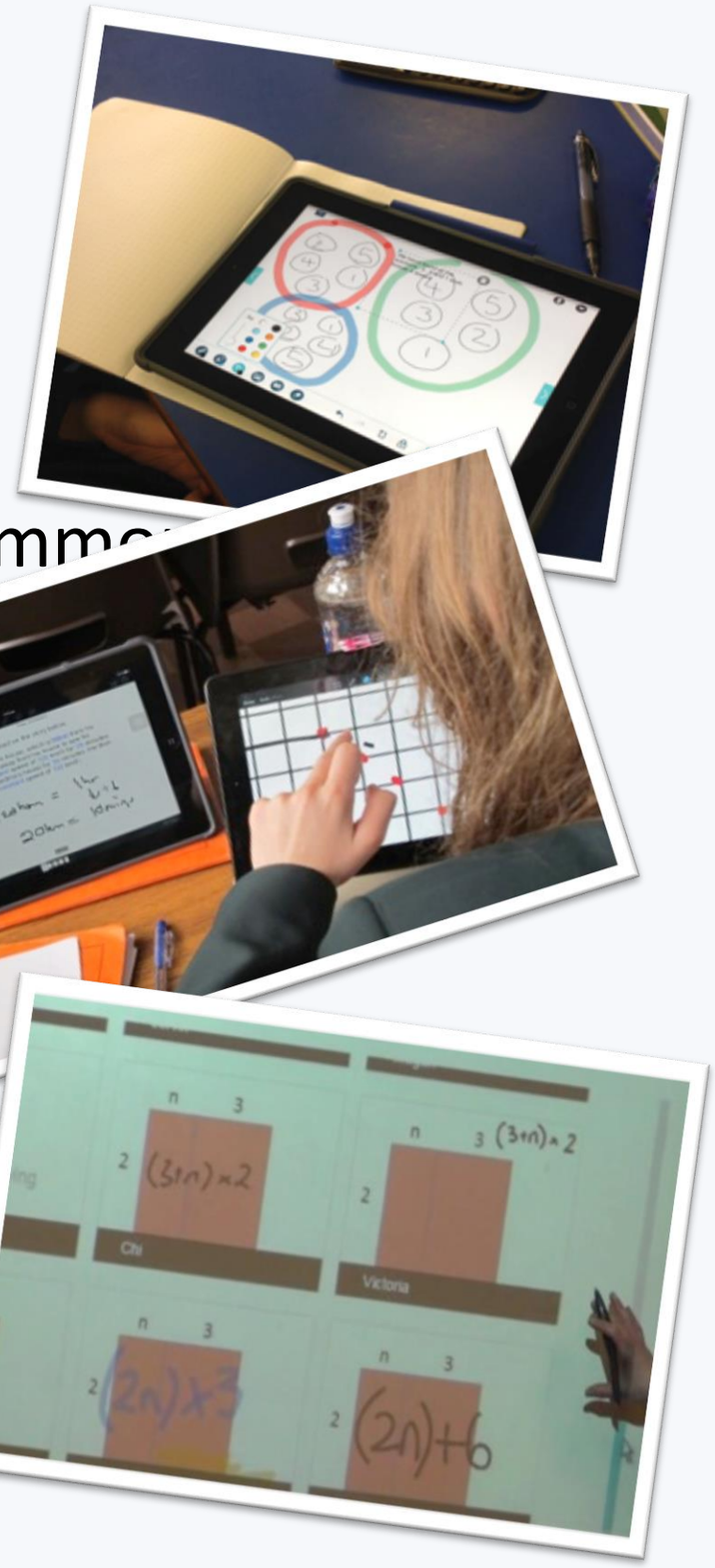
- How do teachers **inform their future teaching** using such data?

Formative assessment and technology

iPads in mathematics lessons

Prior to the lesson teachers used iPads to:

- Send questions to students and receive answers
- Make assessments of students' knowledge and comm misconceptions
- Use their assessments to adapt lesson plans.



During the lesson teachers used iPads to:

- Send questions to students and receive answers
- View students' solutions or work in progress and select samples to display for class discussion

Case study 1: Matthew

Distance-time graphs

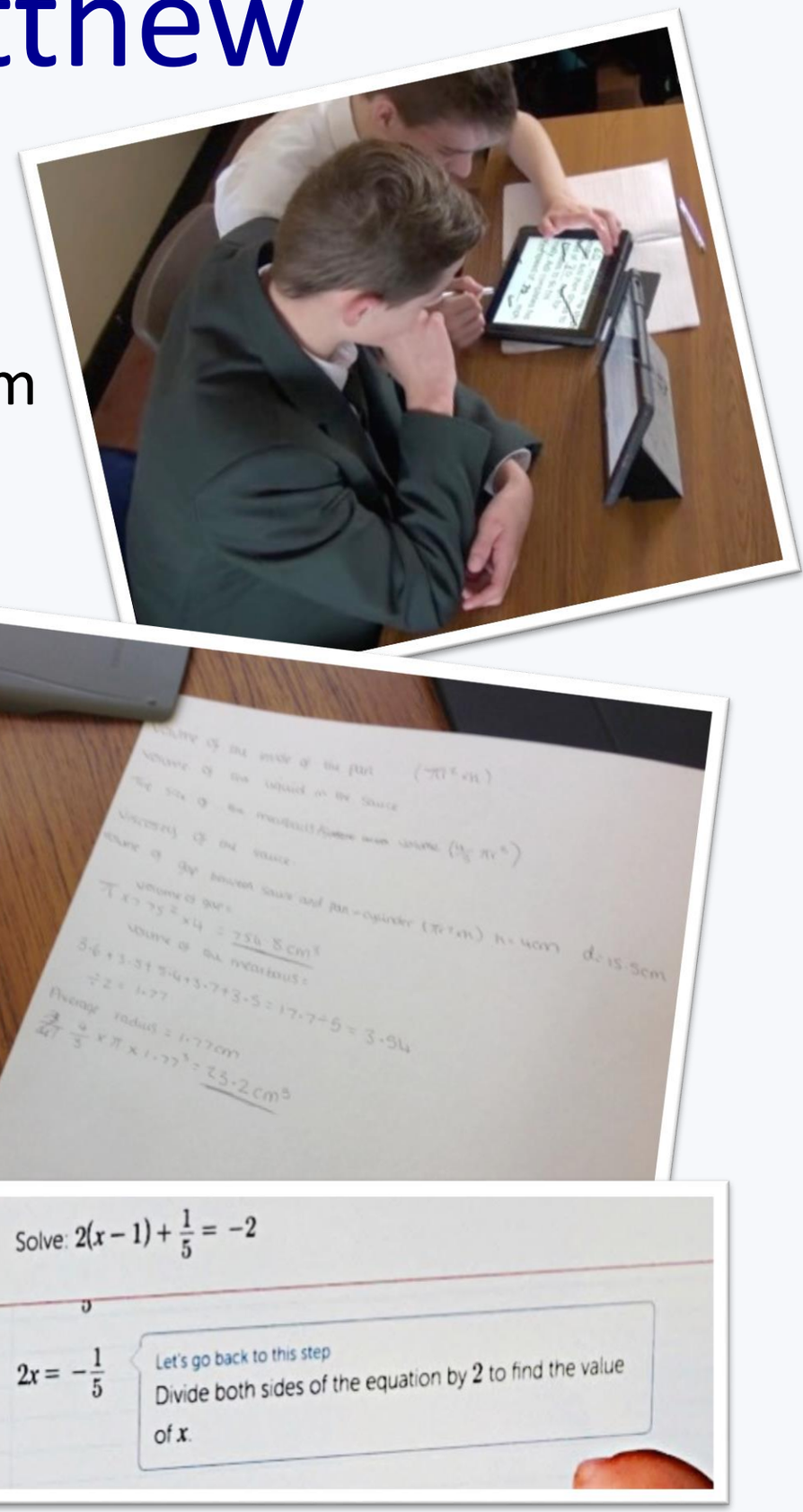
- Sending questions and receiving responses from students using *Showbie*
- Selecting and displaying sample student work for class discussion
- Peer assessment and self-reflection

The meatball problem

- Students working collaboratively
- Class discussion

Algebraic equations

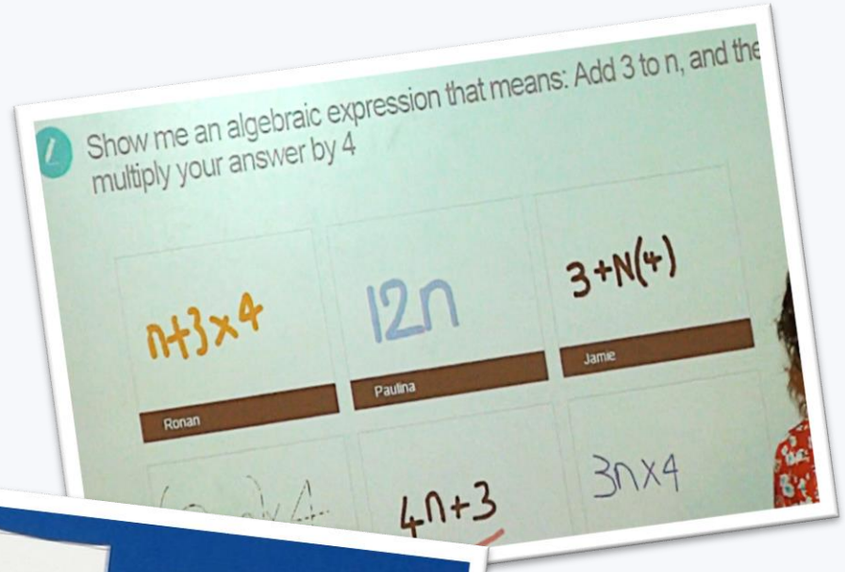
- Computer-led adaptive questioning
- Paired discussion and peer assessment of sample work

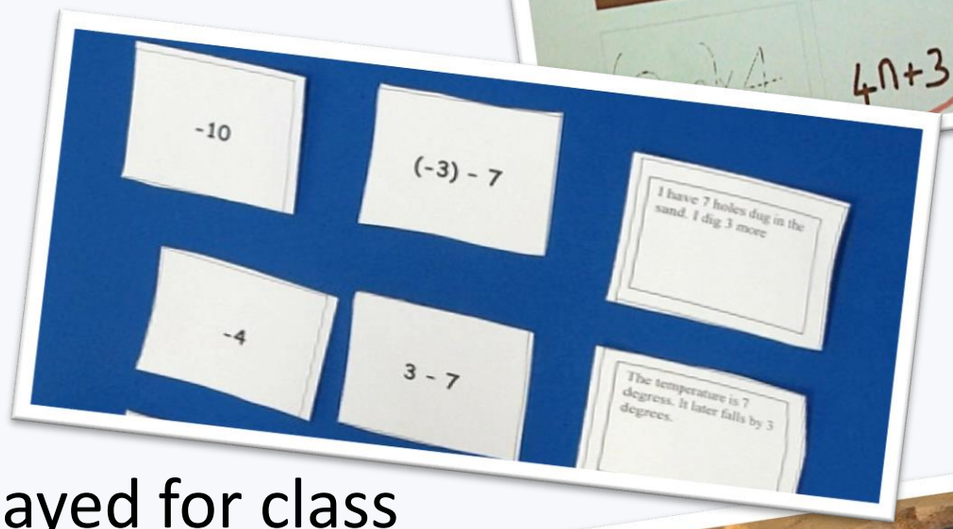


Case study 2: Carol

Lesson 1: Algebraic expressions

- Sending questions and receiving students' responses using *NearPod*
- Selecting and displaying sample student work for class discussion





Lesson 2: Directed numbers

- Pre-lesson diagnostic work using diagnosticquestions.com website
- Collaborative work on card-sort
- Photographs of student work displayed for class discussion

Lesson 3: 'Magic V' investigation

- Pre-lesson diagnostic questions using *NearPod*
- Some collaborative work
- Interim work displayed for class discussion

Intervention cases

The lessons

1. Distance-time graphs
2. The meatball problem
3. Algebraic equations
4. Algebraic expressions
5. Directed numbers
6. ‘Magic V’ investigation
7. Tessellations
8. Areas and perimeters

Initial observations

- Technology can bring benefits but also disadvantages.
- Replicating effective paper-based methods with an iPad does not necessarily result in the same outcomes.
- Some information provided by the technology may not be useful.
- Use of technology needs to be accompanied by suitable pedagogy.
- Having good technical support systems is essential.
- There are benefits in each student having an iPad of their own all the time rather than using class sets.
- Technical confidence in teachers and students can facilitate better creativity and flow of lessons.

Formative assessment areas

How is the technology used when:

- Building on students' prior knowledge?
- Identifying and responding to students' conceptual difficulties?
- Using questioning?
- Increasing student collaboration?
- Enabling students to become assessors?

Examples of the uses of technology in formative assessment processes

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.

Our analysis (1)

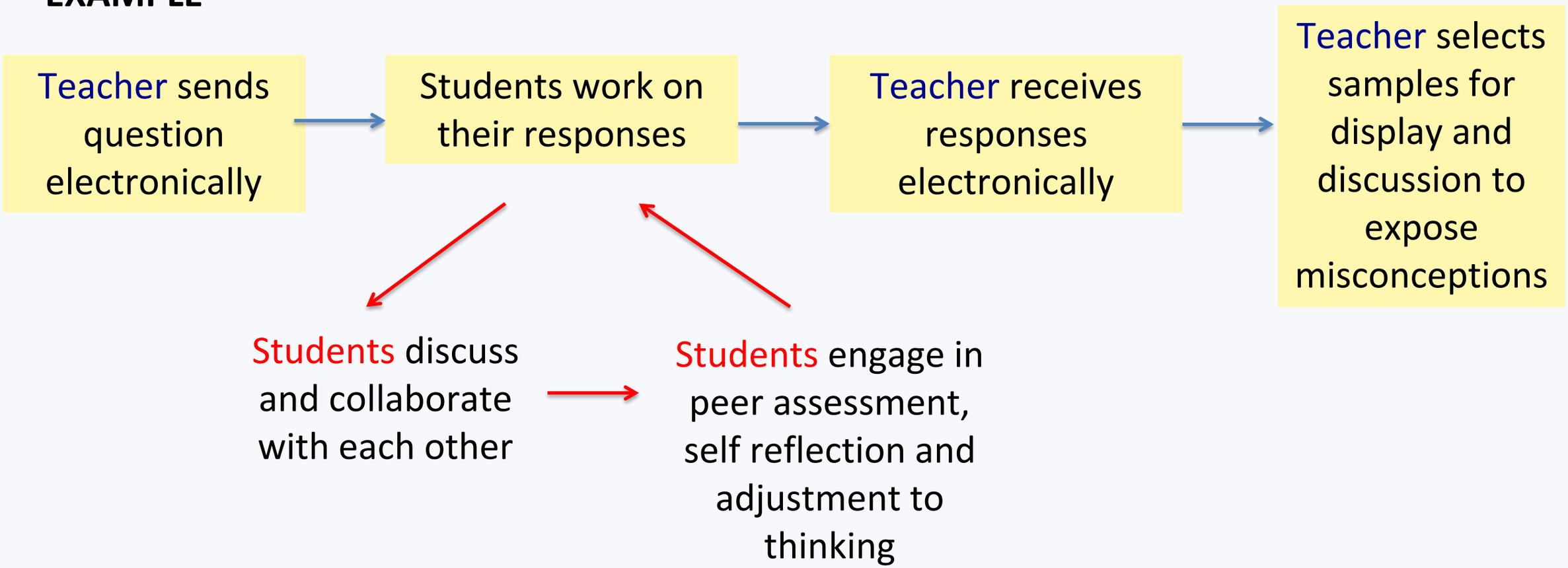
1. Identification of Thompson and Wiliam's (2007) five strategies within the lessons.

	Where the learner is going	Where the learner is right now	How to get there
Teacher	A. Clarifying learning intentions and criteria for success	B. Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding	C. Providing feedback that moves learners forward
Peer	Understanding (shared) learning intentions and criteria for success	D. Activating students as instructional resources for one another	
Learner	Understanding learning intentions and criteria for success	E. Activating students as the owners of their own learning	

Our analysis (2)

2. Identification of teacher-led or student-led processes over different time spans and the ‘nesting’ of these within each other.

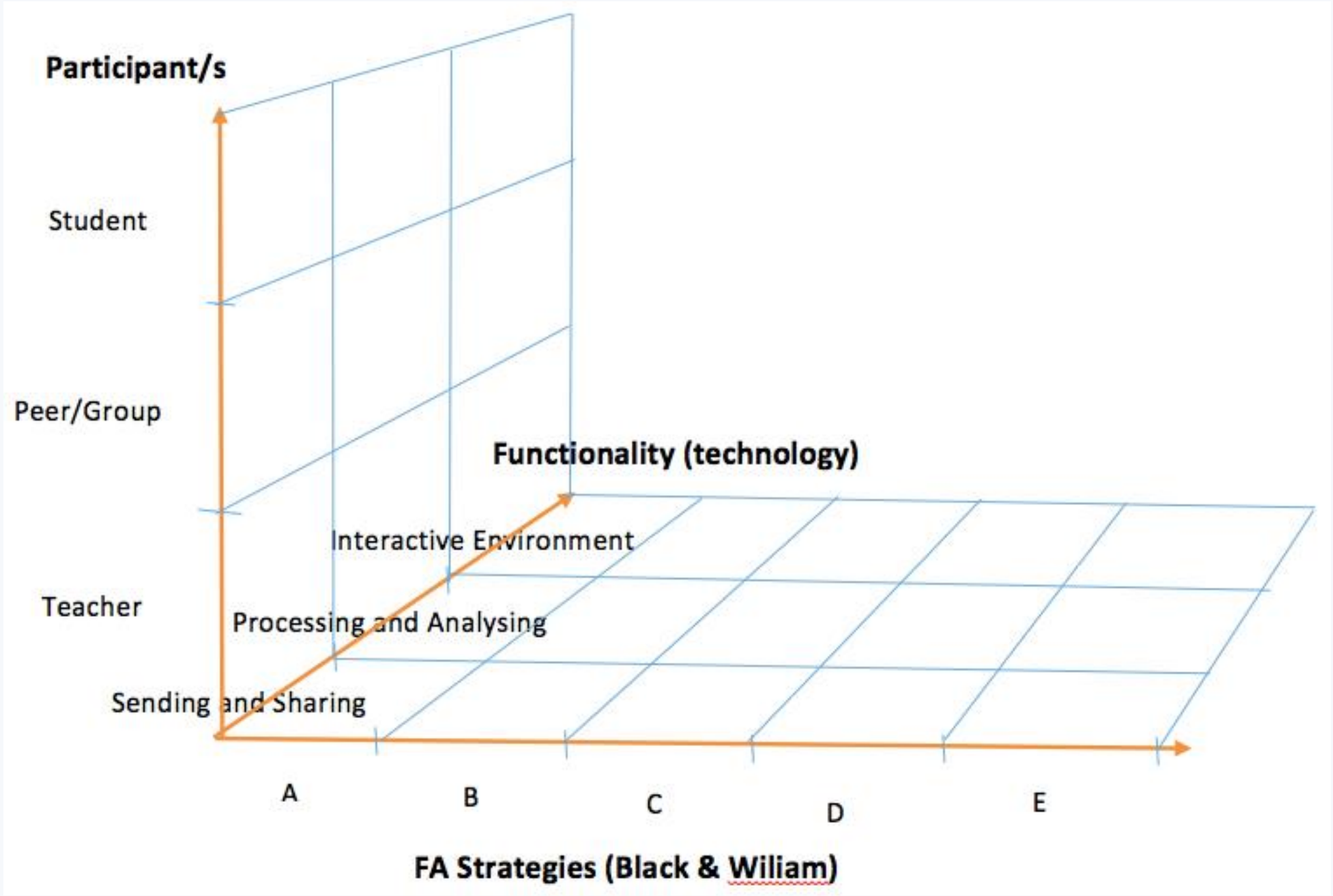
EXAMPLE



Our analysis (3)

3. Classification of the functions of digital technology as:
   - sending and sharing
   - processing and analysing
   - providing an interactive learning environment.

Fasmed framework



Our analysis (4)

4. Mapping of the processes of formative assessment enacted in each lesson.

i. Identification of key points of interaction and possible synergy between technology and teacher pedagogy.

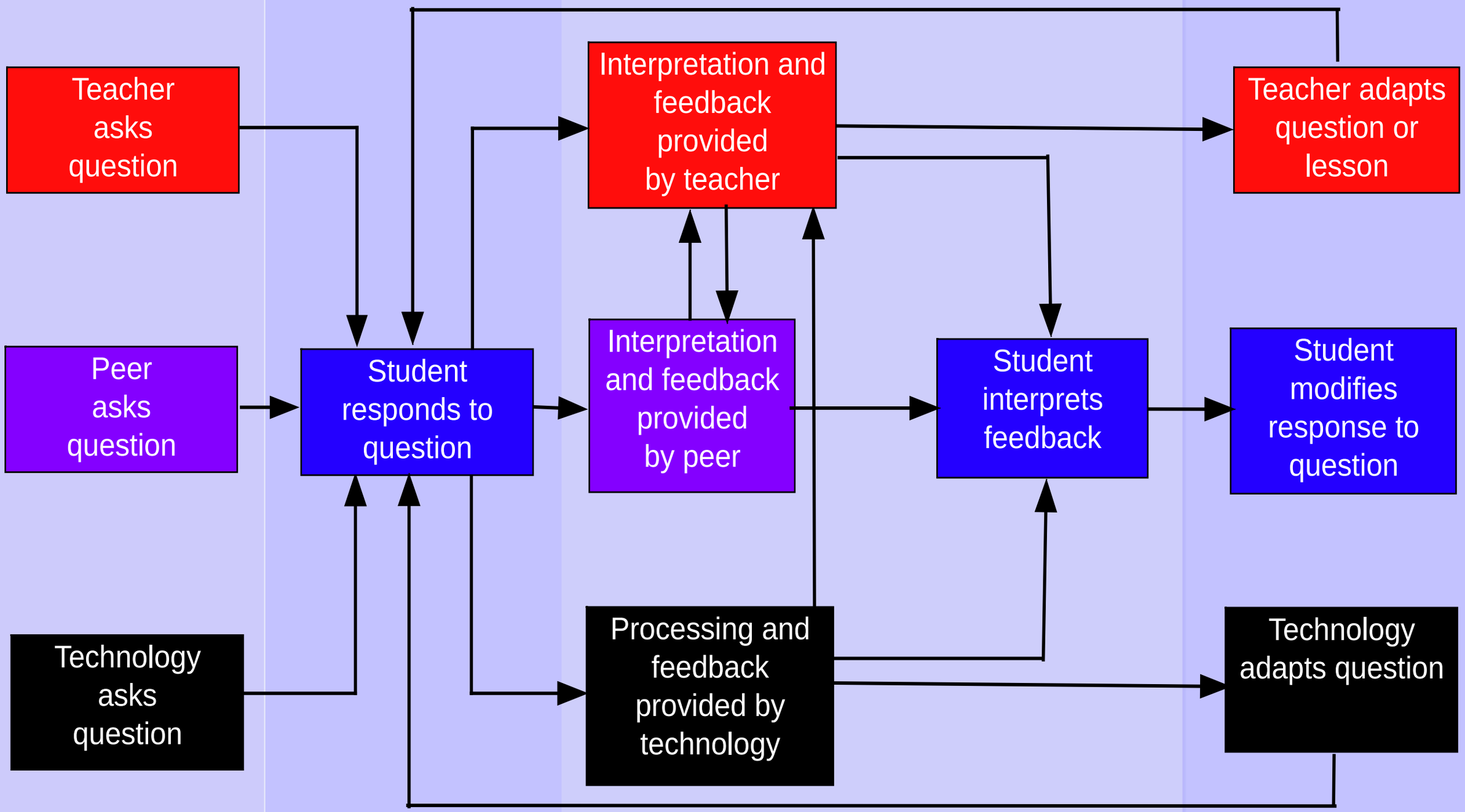
ii. Identification of key teacher actions that utilise the information provided by the technology for formative assessment purposes.

ASK
Elicit information by questioning or observing.

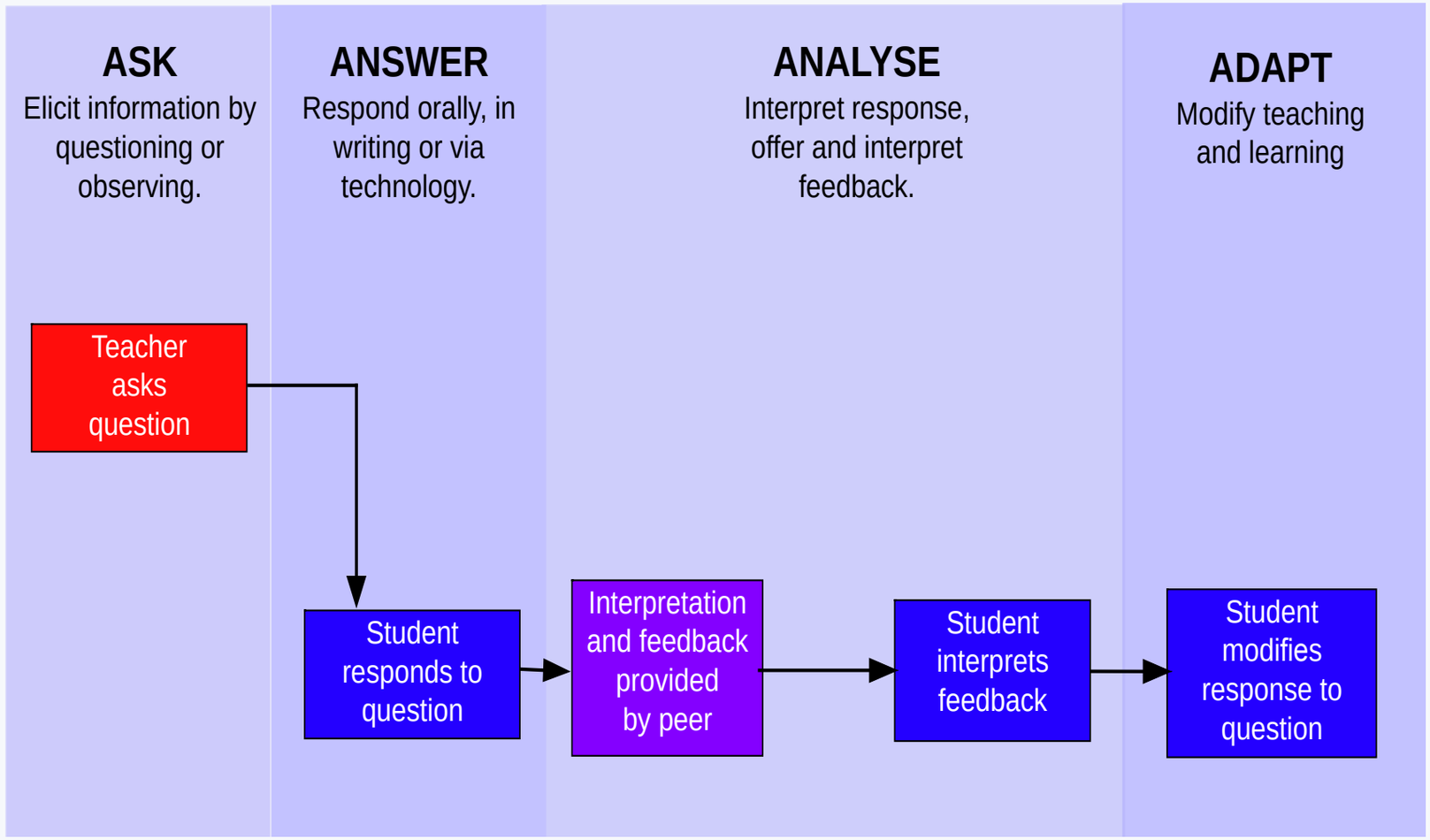
ANSWER
Respond orally, in writing or via technology.

ANALYSE
Interpret response, offer and interpret feedback.

ADAPT
Modify teaching and learning

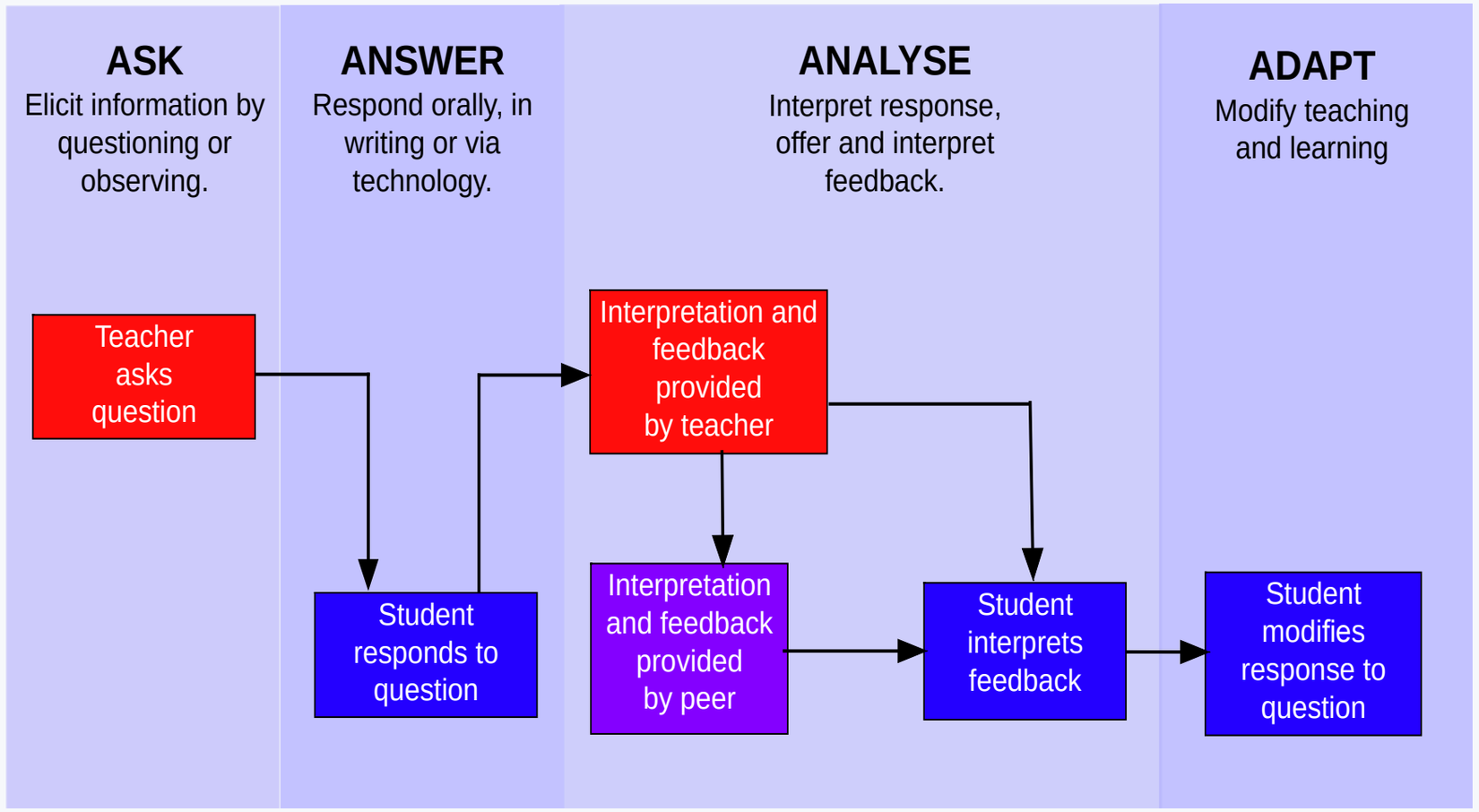


EXAMPLE 1



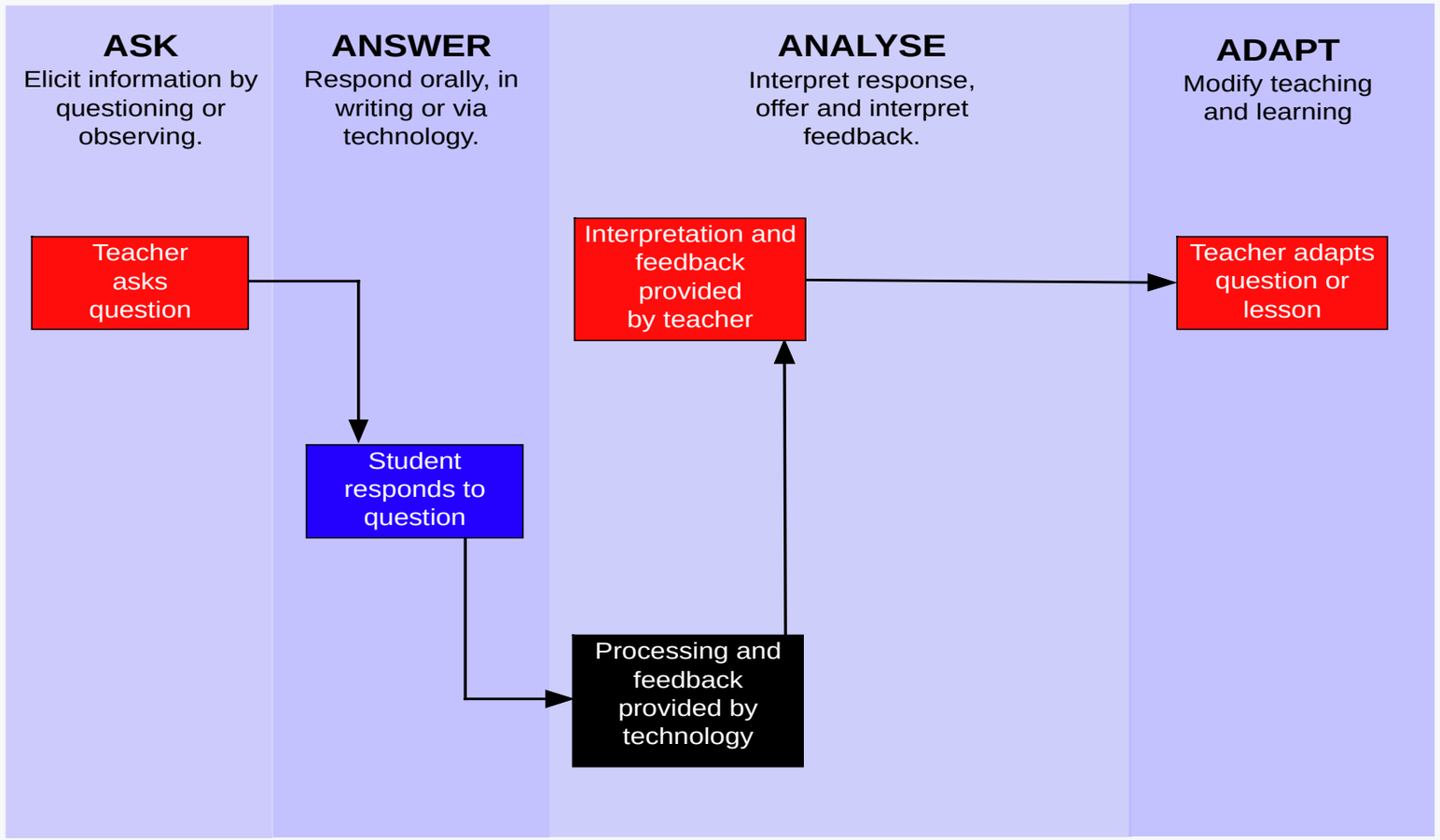
The teacher sends a question to the students electronically – the students work individually on their iPads to find solutions and record their methods – the students then compare and discuss solutions with each other in groups – individual students receive feedback on their solutions from their peers – individual students interpret the feedback, adjust their thinking and produce improved solutions.

EXAMPLE 2



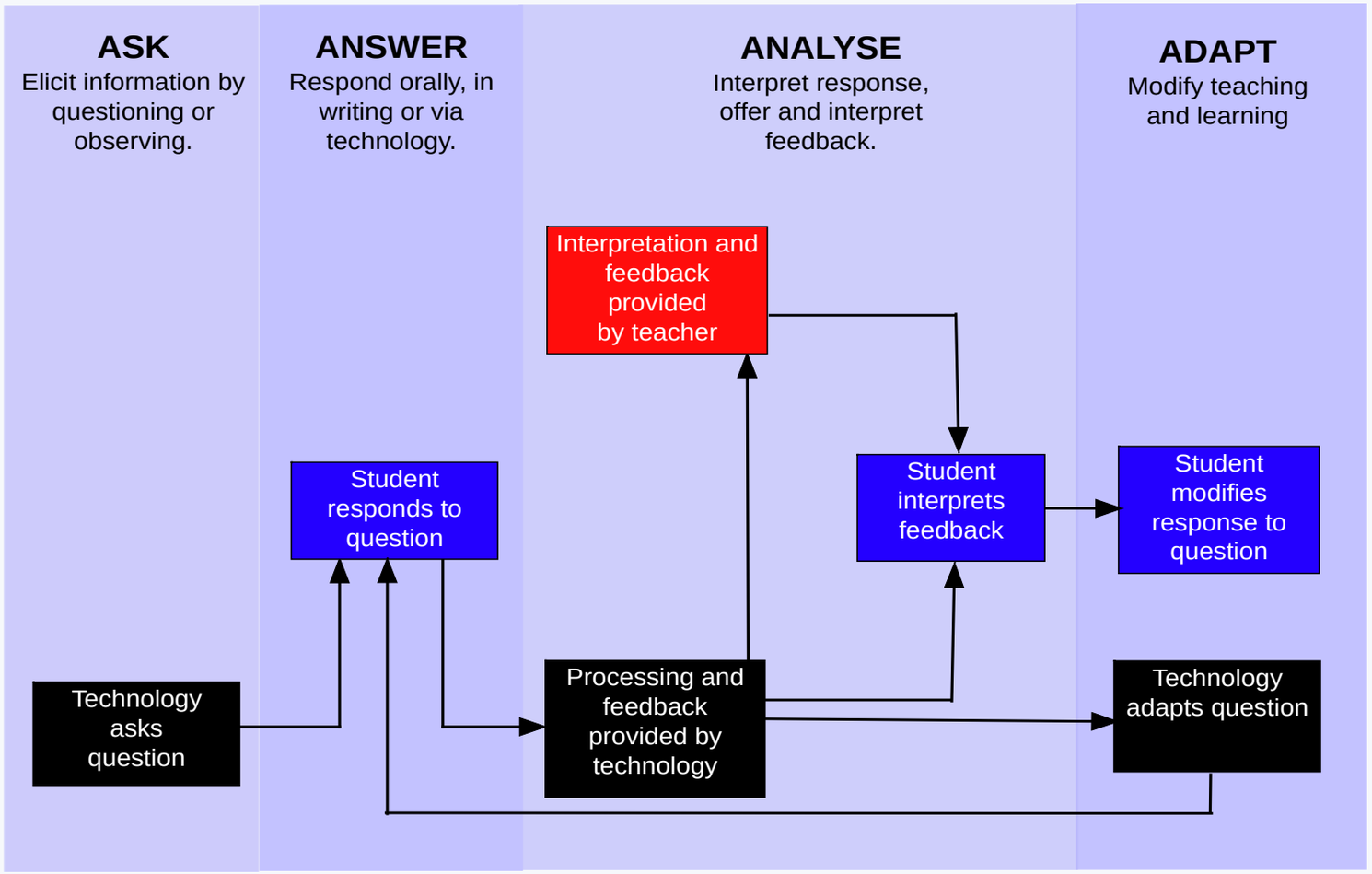
The teacher sends a question to the students electronically – the students work individually, record their solutions, with their working, on their iPads and send these electronically to the teacher – the teacher displays a sample student response and asks the class to comment on the solution - the students provide feedback on the sample student response. The teacher may also provide feedback. The student interprets this and is challenged to rethink their solution.

EXAMPLE 3



Multiple-choice questions are written by the teacher and sent electronically to the students prior to the lesson – the students send their responses back electronically – the computer marks the student work and processes the class set of responses – the computer provides feedback to the teacher in the form of a visual summary of the correct and incorrect responses to each question for the whole class (e.g. bar chart) – the teacher interprets this information and adjusts their lesson plan to focus on the areas of conceptual understanding that are highlighted as requiring development.

EXAMPLE 4



The technology generates a series of questions that have not been directly selected or written by the teacher - students respond individually - students record their responses on the computer - the technology processes each response and sends back a cumulative summary to the teacher that they can access at time to gain an overview of progress at that instant. The technology also provides feedback to the student on each question as they complete it and adapts the next question, making it easier or harder depending on the response elicited. This cycle is repeated.

Questions and comments

- What part of this is most useful for teachers?
- What else would be useful in a web-based professional development ‘toolkit’ for teachers?

Thank You!

Malcolm Swan

Diane Dalby

Geoff Wake