

**Innovation  
& Identity**



Schools developing Junior Cycle

# Mathematics Conference

Čatež

22 August



# Why change?

- Develop skills for the 21<sup>st</sup> century.
- Employment demands
- Information from research.



- **Look over the list of 10 features of school practice and consider what would makes a difference to a student's learning.**
- Team Teaching
- Class Size
- Direct Instruction
- Computer Assisted Learning
- Quality of Teaching
- Student's disposition to learn
- Peer Tutoring
- Effective Feedback
- Student's prior ability
- Questioning



# The result of Hattie's research

1. Feedback	1.13	Teacher
2. Student's Prior Cognitive Ability	1.04	Student
3. Quality of Teaching	1.00	Teacher
4. Direct Instruction	0.82	Teacher
5. Student's disposition to Learn	0.61	Student
6. Peer Tutoring	0.50	Student
7. Questioning	0.41	Teacher
8. Computer Assisted Teaching	0.31	Teacher
9. Testing	0.30	Teacher
10. Class size	0.05	Teacher



## Israeli study investigating the effects of different types of feedback on pupils' motivation and attainment

Comment only

Individual comment plus grade

Grade only

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How e  
What d

# Feedback -Marks /Comments

Group	Performance	Motivation
Comment only	Raised and the improvement was sustained over sequence of tasks	Influenced by ability: <ul style="list-style-type: none"> <li>• High achievers maintained a high level of interest irrespective of feedback type</li> </ul>
Grade + comment	Steady decline across tasks	<ul style="list-style-type: none"> <li>• Low achievers who received grades quickly lost interest</li> </ul>
Grade only	Initial improvement which was not sustained	



# What type of feedback?

- **Feedback** such as ‘well done you are good at this’ is not helpful. **The feedback must be informative rather than evaluative**
- Hattie has made clear that ‘feedback’ includes telling students what they have done well , and what they need to do to improve (corrective work, targets etc), but it also includes clarifying goals.





# Effective feedback

- **What would this feedback look like in a mathematics classroom?**

In the mathematics classroom, such feedback could be given orally, as in this example from Saphier (2005, p. 92):

- *Teacher:* What part don't you understand?

*Student:* I just don't get it.

*Teacher:* Well, the first part is just like the last problem you did. Then we add one more variable. See if you can find out what it is, and I'll come back in a few minutes.



# Asking good questions: Israel

Which fraction is the smallest?

- a)  $\frac{1}{6}$ , b)  $\frac{2}{3}$ , c)  $\frac{1}{3}$ , d)  $\frac{1}{2}$ .

Success rate 88%

Which fraction is the largest?

- a)  $\frac{4}{5}$ , b)  $\frac{3}{4}$ , c)  $\frac{5}{8}$ , d)  $\frac{7}{10}$ .

Success rate 46%; 39% chose (b)

Vinner (1997)



# Eliciting evidence

- Key idea: questioning should
  - cause thinking
  - provide data that informs teaching
- Improving teacher questioning
  - generating questions with colleagues
  - appropriate wait-time
  - basketball rather than serial table-tennis
  - ‘No hands up’ (except to ask a question)



# Questioning in math: Discussion

Look at the following sequence:

3, 7, 11, 15, 19, ....

Which is the best rule to describe the sequence?

- A.  $n + 4$
- B.  $3 + n$
- C.  $4n - 1$
- D.  $4n + 3$



# Hinge questions

- A hinge question is based on the important concept in a lesson that is critical for students to understand before you move on in the lesson.
- The question should fall about midway during the lesson.
- Every student must respond to the question within two minutes in discussion with their partner
- The teacher collect the answers from the all the paired discussions to ensure that everyone understands the key concept before moving on with the lesson.

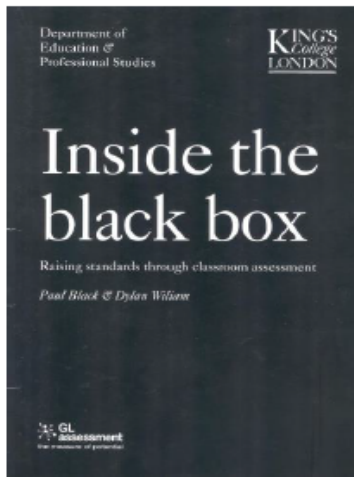


# Self and peer assessment

- One approach many teachers have used as part of assessment for learning in mathematics has been the use of ‘traffic-lighting’ to develop self-assessment skills.
- The teacher identifies a number of objectives for the lesson, which are made as clear as possible to the students at the beginning of the lesson. At the end of the lesson, students are asked to indicate their understanding of each objective by a traffic light colour.

Paul Black and Dylan Wiliam

## V založbi Zavoda RS za šolstvo napovedujemo prevoda knjig



### INSIDE THE BLACK BOX

*Raising standards through classroom assessment*

Paul Black & Dylan Wiliam

So naši razredi res kot *črne škatle*, kjer nam bo na podlagi zahtev od zunaj (učni načrti, pravilniki, zunanja preverjanja, želje staršev, visoka pričakovanja vodstva itd.), uspelo doseči želene rezultate?

Avtorja knjižice predstavljata formativno spremljanje, s katerim izboljšujemo kakovost učenja in poučevanja, **prispevamo k izboljšanju dosežkov vseh učencev** in jih spodbujamo k prevzemanju odgovornosti za svoje učenje.



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