

Formative Assessment in Science Classrooms

The achievement gains associated with formative assessment have been described as “among the largest ever reported for educational interventions”, (OECD, 2005). A leading researcher in this area is Dylan Wiliam. Click on the picture to access a video in which he outlines the 5 key strategies that underpin the use of formative assessment classroom techniques and also explains how his work is based on best practice by teachers.



5 key strategies underpin the use of formative assessment classroom techniques

- Use of Learning Intentions and Success Criteria.
- Facilitating productive classroom discussions, which elicit evidence of learning and understanding.
- Providing feedback that moves learning forward.
- Activating learners as instructional resources for one another.
- Activating learners as the owners of their own learning.

Some key features of formative assessment centred classrooms

- These classrooms are learner centred.
- Teachers interact more frequently and more effectively with students.
- Learning for understanding is promoted and monitored.
- Assessment happens continuously, but not intrusively, and is an integral part of the learning process.
- Both teacher and students are part of a learning community.
- Students' thinking is made visible, both to the teacher and to other students.

What particular benefits do the use of formative assessment techniques bring to **Science** classrooms?

- Students can be given opportunities, in both small groups and whole class settings, to explore their ideas and current understanding in depth.
- Students' thinking can become more explicit during scientific inquiry, as students can be encouraged to commit to a prediction or outcome, supported by evidence from their prior knowledge and experiences, and to share these ideas with peers or the class.
- A classroom culture of ideas, not answers can be created.
- Students can be encouraged to take risks in a climate where it is acceptable to share an idea without fear and where the norms in the classroom are such that everyone's ideas are respected and acknowledged.
- Learning through argumentation and discussion is promoted and student to student dialogue, as well as student-teacher dialogue is encouraged.
- Students are encouraged to listen carefully as different ideas are raised and discussed and ideas modified in the light of new evidence. In this way concepts are formed.

Helping students understand the shift to formative assessment classrooms

When introducing formative assessment classroom techniques such as **"think pair share"** you might consider letting students know how the technique will help their learning. Research shows that getting students to actively think about how they are learning is an important first step.

Students who are not used to a formative assessment classroom might be confused by techniques such as **"no hands up"**, and explaining that all students must be ready to give an answer, even if that answer is "I don't know", can help anxious students concentrate on developing an answer, rather than worrying about what will happen if you ask them after a reasonable wait time and they still do not have an answer!

Some students do not appreciate how using **"wait time"** of more than 3 seconds improves both the type of answers and the number of students who have an answer. But even the quickest thinker can learn that through "wait time" they have the opportunity to revise and improve their thinking, especially when questions are more open, and so using "wait time" will be beneficial for all students.

Beginning to use formative assessment techniques

- Choose a class group that you know well and explain to them what the purpose of the technique is.
- Plan on it taking more time than you had anticipated. Initially you may have to spend time explaining the process to your students but this is time well spent.
- Try not to jump in too quickly when students are uncertain. Give students time and space to figure out what they are trying to achieve.
- Refrain from immediately correcting misconceptions when they surface. If students do not work through these misconceptions they will persist and students will simply revert back to them.
- Think about WHY you are using a formative assessment technique.
- Expect resistance. Developing students' skills as learners will take time and persistence.
- Reflect. What added value, if any, did using a technique bring to your classroom?
- Share. Discuss what you are trying with your colleagues.

You might like to follow this link to explore this topic further:

<https://www.nwea.org/blog/2013/formative-assessment-strategies-dylan-wiliam-on-demand-webinars/>

References:

Keeley, Page. (2008). *Science Formative Assessment. 75 Practical Strategies for Linking Assessment, Instruction and Learning*. Corwin Press. NSTA press.

Keeley, Page. (2015). *Science Formative Assessment Volume 2*. Corwin Press. NSTA Press.

William, Dylan. (2011). *Embedded formative assessment*. Solution Tree Press