

Review

Design and Technology Inside the Black Box: Assessment for learning in the design and technology classroom

Title:	Design and Technology Inside the Black Box: Assessment for learning in the design and technology classroom
Author/Editor:	Judy Moreland, Alister Jones and David Barlex
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This small and very useful booklet is part of the Black Box Assessment for Learning series that has grown out of research into formative assessment conducted by the team led by Prof Paul Black at Kings College, London. It draws directly on the classroom research conducted by this team in addition to further assessment research conducted in the context of Technology Education, by the Centre for Science and Technology Research (CSTER) at Waikato University in New Zealand. These two sources of research, coupled with the joint New Zealand/UK authorship, provide one of the booklet's strengths – that it presents a trans-national approach tied fundamentally to learning and teaching in Design and Technology education, rather than to any particular national curriculum context.

The text begins by providing an overview of the scope of the booklet and then moves quickly to give a background history to assessment in Design and Technology education. The strengths and contribution of the work conducted at Kings and Waikato are outlined and are put into a historic context with the understanding of capability developed through an iterative process, developed initially through the Assessment of Performance Unit D&T project, and more recently through the Assessing Design Innovation project. In drawing attention to the summative context of this research, the authors highlight the importance of drawing on practices of formative assessment actively developed through curriculum initiatives, citing in particular the Nuffield Design and Technology Project, the Young Foresight project and the Electronics in Schools project.

The combination of generic and (Technology Education) specific assessment research with the classroom practices developed through the curriculum development projects is

the second strength of the text – that it provides theory well and truly grounded in practice in Design and Technology classrooms. The many examples drawn on throughout the text attest to this and contribute significantly to both the applicability and the accessibility of the ideas presented.

The next strength of the booklet is that it deals with formative assessment placed firmly within the aims of Design and Technology teaching and a clear framework of principles of learning, such that the assessment is embedded in and integral to the learning and teaching processes that are promoted.

In a consideration of aims, the following statement underscores the universality that provides the trans-national value of the text.

While curricular changes may affect the approach that teachers take to technology, the fundamental ideas that we are trying to convey to learners are the same. People use technology to expand their possibilities, to intervene in the world through the development of products, systems and environments. To do this, practical and intellectual resources are applied. (p. 4)

The authors draw attention to the important but simple reality that it is through the application of knowledge, skills and understandings that learners reveal their abilities and that formative assessment becomes a crucial ingredient of this process through the 'two-way' gateway that formative feedback can provide. They also draw attention to the complexity of learning and teaching in Design and Technology that makes what appears to be so simple, such a challenge to achieve, discussing four key aspects of knowledge that contribute to this challenge: the level at

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which knowledge is useful in a technological context; the differences between the knowledge required to understand a technological problem as opposed to the knowledge needed for a solution; the level at which the knowledge is needed; and the creativity with which the knowledge is applied. All of the above are related to the learner's understanding of the nature of technology and the contexts in which design and technological tasks are set. The complexity is not presented to confound the reader, but to provide a realistic backcloth to the tactics and strategies that follow.

The authors also take a clear stand on the principles of learning they consider critical:

- starting from where the learner is;
- learners being active in the process – learning is done *by* them not *for* them;
- the importance of dialogue;
- the importance of learners understanding learning intentions;
- that feedback should tell learners how to improve.

These principles are explored further through the remaining sections of the booklet.

The authors turn first to the importance of planning for learning goals (conceptual, procedural, societal and technical) and planning activities that will promote the identified goals. They raise the importance of teachers rehearsing activities to identify both the learning opportunities and challenges, so that their planning can address these and of carefully planning the sub-tasks of a project so that teachers can build links between lessons and use the beginnings and ends of lessons to engage in dialogue about what has and will be learned.

The place of dialogue is explored in an extremely valuable way as the authors expand on the importance of peer and self assessment as well as the teacher working alongside learners, modelling thinking and designing, using interchange and reciprocity as ways of engaging learners in reflecting on their learning and of providing feedback. Examples are given of the ways in which classroom dialogue can be scaffolded by teachers in ways that allow learners to articulate, and teachers to gauge, understanding. Attention is drawn to the particular value in Design and Technology of 'multi-modal communication' such as talking, drawing, modelling, constructing and testing.

Throughout, the importance of feedback is both discussed and exemplified, with three particular aspects of feedback identified: negotiating learning goals; focusing on strengths

and weaknesses; and planning next learning steps. There is also consideration given to the importance of feedforward, making an important and constructive link between formative and summative assessment. Within this, importance is placed in holistic assessment, within which strengths and weaknesses can be identified and addressed through future planning for learning and teaching.

In the final sections the authors identify both the value and challenge of developing a departmental approach that enables formative assessment to remove fragmentation from the learning process and build genuine continuity and progression. The further value of a whole school approach with support from senior managers is also pinpointed.

Through the whole booklet the text is presented in a clear and accessible manner with a strong focus on practice and pedagogy, underpinned by theory and research. Extensive use is made of illustrative examples, often drawing directly from the words of teachers and learners, giving a very real sense of a grounded and achievable approach being presented. As much as anything, there is a sense that the whole booklet is really about good learning and teaching, with assessment properly embedded as a facilitator for both processes.

As a pre-service teacher educator, the booklet will become a core text for my students, as I believe it provides fundamental insights and approaches to assessment in a highly effective and readable manner. As an in-service provider on approaches to assessment in Design and Technology, I would recommend the booklet to any teacher keen to improve the effectiveness of formative assessment in their classroom – whatever their phase of education or national context. As an assessment researcher, I have found the booklet confirming and refreshing – bringing new insights and ideas and expanding existing beliefs.

In short, the booklet is much needed, valuable and, rather than timely, probably long overdue. The authors deserve the community's gratitude.