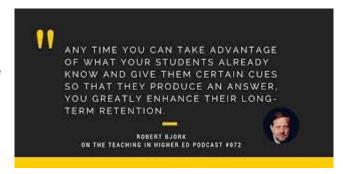Ysgol Tregŵyr
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Bjork and Bjork's 'Desirable Difficulties to Enhance Learning.'

Introduction

Robert Bjork, over 20 years ago, developed the notion of 'desirable difficulties' in cognitive psychology. Since then, he and Elizabeth Bjork have worked to develop this notion further and examine the theory behind it.

In essence, **a 'desirable difficulty' is a pedagogical practice whereby learning tasks are made more difficult but also more *effective*.** However, 'desirable' becomes a key factor when planning for these difficulties in our teaching.

> ANY TIME YOU CAN TAKE ADVANTAGE OF WHAT YOUR STUDENTS ALREADY KNOW AND GIVE THEM CERTAIN CUES SO THAT THEY PRODUCE AN ANSWER, YOU GREATLY ENHANCE THEIR LONG-TERM RETENTION.
>
> ROBERT BJORK
> ON THE TEACHING IN HIGHER ED PODCAST #072

As we all know, in every classroom pupils 'sit' at different levels of understanding. We differentiate our lessons because of this. Consequently, some pupils may find the acquisition of knowledge harder than other pupils in the class. As a result, we must be wary of assuming that because we have made a task 'difficult', it will enhance their learning. Instead, we need to ensure that the difficulty is a 'desirable' one.

In order to achieve this, a pupil must already have a certain level of knowledge in relation to the subject. They must also have a suitable level of support in order for the learning to be a "desirable difficulty." If a pupil does not have the background knowledge or correct support structure, then the acquisition of knowledge will be too difficult and the learning will be *less* effective. Equally, if a task is too easy and does not require mental effort, then the short-term performance may be increased but the long-term retention of this learning will suffer. Instead, conditions that create challenges and slow the rate of acquisition of knowledge often optimises long-term retention and transfer.

As a result, a seeming paradox occurs between performance and learning. To understand this, we can consider the following terms to mean the below:
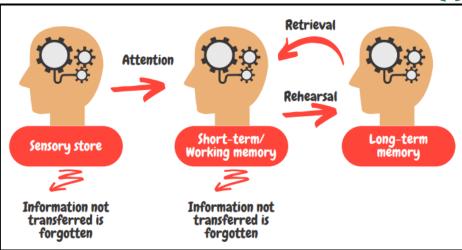
Performance = what we can observe and immediately measure in our classroom.
Learning = a long-term change in knowledge and understanding (a change in a pupil's schema).

What can happen in education is that we can interpret current performance as an indicator of learning. So, to an extent, we can confuse or misread current 'good' performance as a gauge for valid long-term learning that has not *actually* been achieved.

How do we know that valid learning has occurred?

Brown, Roediger and McDaniel (2014) describe learning as "acquiring knowledge and skills and having them readily available from memory so you can make sense of future problems and opportunities." This thereby links to the notion of Retrieval. Every time we learn, this information is first within our working memory. Some of it is then transferred to our long-term memory and this information can be recalled at a later date. If we encourage learning opportunities that require pupils to retrieve and apply this information, pupils *can* find it difficult. However, the more pupils revisit this information and – importantly – apply this information or make connections with new learning, the more effective learning will become. By introducing opportunities for "desirable difficulties" in the classroom, we can improve both performance and 'actual' learning.

Something that Bjork makes clear is that desirable difficulties are desirable because "they trigger encoding and retrieval processes that support learning, comprehension and remembering." So what can we do, in the classroom, that will support this?

Varying our Practice

Spacing (Retrieval Practice)

Although performance for tests can seemingly be enhanced by 'cramming' sessions, in reality this only benefits short-term memory and does not benefit pupils in the long-term. Instead, spacing practice by revisiting learning in a spacing method (at different intervals in time) can enhance pupils' long-term retention and overall performance in an exam later on.
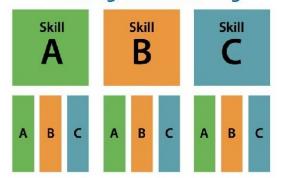
You can use various methods of Retrieval Practice to carry this out in your classroom (see May's Research Summary).

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Interleaving as opposed to Blocking

Blocking vs Interleaving

Skill A	Skill B	Skill C

| A | B | C | A | B | C | A | B | C |

Blocking can be defined as studying a topic or skill in a set 'block' of lessons.

Interleaving can be defined as switching between topics or skills, or switching between different problem types, rather than studying each one in a 'block.'

For example, by interleaving problem types in Maths, during initial practice there may be more inaccuracies as pupils engage with the material. However, in testing, studies suggest there will be more accuracies later on as pupils will have learnt more effectively.

BLOCKED PRACTICE

$$\frac{5}{9} \times \frac{1}{8} = ? \qquad \frac{1}{6} \times \frac{2}{7} = ? \qquad \frac{4}{5} \times \frac{2}{3} = ? \qquad \frac{2}{9} \times \frac{3}{5} = ?$$

INTERLEAVED PRACTICE

$$\frac{5}{9} \times \frac{1}{8} = ? \qquad \frac{7}{8} \div \frac{5}{6} = ? \qquad \frac{2}{3} + \frac{1}{5} = ? \qquad \frac{2}{9} \times \frac{3}{5} = ?$$

For instance, a study into movement patterns and the results of blocked learning versus interleaving, discovered that pupils who had been taught via blocked learning initially outperformed those who had been taught via interleaving. Yet, when pupils were re-tested 10 days later, those who had been taught via interleaving far outperformed those who had be taught through blocking. Part of this is due to the testing effect; as pupils are tested memory is improved. So, even if a learner is unable to answer, the act of trying to remember that material can improve the later learning of the material when faced with it again.

Consequently, although initial performance during interleaving may lead to it feeling like desirable difficulties are actually detrimental, in the long run pupils perform better.

Generation Effect

Bjork believes that if pupils are given the opportunity to generate an answer, solution or procedure rather than being told or given the answer, they are more likely to benefit from this in the long-term and learning will be more effective.

This means that pupils should be given the opportunity to draw upon current information, past knowledge and experiences, and should generate their own answers based on these. This could be as simple as allowing pupils to generate a success criteria or as complex as pupils being able to generate their own method to carry out an experiment.

Class generated: what is our success Criteria?
- Embed a range of apt quotes for comparison.
- SQEET
- Tentative language
- Comparison connectives
- Focus on task
- Original ideas/interpretations
- Explore and evaluate how the language/structure of the poem shapes the meaning
- Effect on our emotions – how does it resonate with us?
- What message are the poets trying to get across?
- Focused language analysis
- discuss poetic devices used and their effect
- Use TITLES
- Compare all the way through

AO1
AO2
AO3

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Testing

As previously mentioned, by allowing opportunities for testing, pupils are encouraged to recall and apply information. This process in itself aids both long-term retention of the information, and allows teachers and pupils alike to identify gaps in knowledge. This then allows for further exploration of the information, whether that be a pupil studying at home or a teacher re-visiting it in in a classroom. Finally, it also allows for pupils to 'practise remembering' which, in turn, will help to enhance neural pathways and deepen learning.

OMAM Section 1 Retrieval Practice (9N English 2020)

Hi Megan, when you submit this form, the owner will be able to see your name and email address.

* Required

1. What was George's first complaint to Lennie? *
   (1 Point)
   ○ That Lennie ate too much
   ○ That Lennie couldn't read
   ○ That Lennie drank from dirty water

Encouraging Resilience

It seems pertinent to end by acknowledging that 'desirable difficulties' *are* difficult and learners can resist them. However, we can combat this. Often, we talk about the 'why' of the learning with pupils but do we ever talk about the 'how' of the learning?

Perhaps, if we explain to pupils that learning needs to be difficult for it to stick, we can encourage our learners to see the value in what we are attempting to do and thereby motivate them to harness that 'power of yet' attitude.

One way we can do this is in the language of learning in the classroom. When a pupil finds things challenging, consider using phrases like:

- I know you're finding this tricky but I'm pleased; this means your brain is having to think harder about it.
- Learning isn't easy. If you're finding this tricky, you're doing it properly.
- Sometimes we have to get stuck, but its persevering and figuring out how to get through it when we are stuck that helps us to learn.
- I know you didn't do as well as you wanted, but your brain has had to try to remember the information. This means it's making little pathways in your memory that will help you next time you look at this topic.

Ultimately, by encouraging pupils to embrace 'desirable difficulties' we can empower them to become ambitious, capable learners who seek enhanced learning opportunities.

References and Further reading:

Bjork, R and Bjork, E. (2011). Making Things Hard on Yourself, But in a Good Way: Creating Desirable Difficulties to Enhance Learning. In M. A. Gernsbacher, R. W. Pew, L. M. Hough, J. R. Pomerantz (Eds.) & FABBS Foundation, *Psychology and the real world: Essays illustrating fundamental contributions to society* (pp. 56–64). Worth Publishers.

Brown, P. C, Roediger, H. L. III, and McDaniel, M. A. (2014). Make it Stick: The Science of Successful Learning. Belknap Press of Harvard University Press.