**The power of a knowledge-rich curriculum in science**

What type of curriculum do you have in your science department? How do you know? These are questions recently posed to Heads of Science at the Heads of Science Network meetings.   
In 2018, Ofsted listed three main types of curriculum structure.1

1. Knowledge-led approach

*The curriculum is the mastery of a body of subject-specific knowledge defined by the school. Skills are considered an outcome of the curriculum, not its purpose*.

1. Knowledge-engaged approach

*Less reliant on knowledge, it has value but places emphasis on developing skills*

1. Skills-led curriculum

*A small number of schools build their curriculum around skills development and see knowledge as disconnected facts.*

The skills-led curriculum is very rare in science. The nature of the subject means that it’s impossible to ignore knowledge altogether.   
However, the idea of a knowledge-rich curriculum is spreading and many are unsure precisely what one may look like.

The nature of educational discourse in the late 1990s and 2000s led to a move away from knowledge in science (and in education in general). The enquiry approach was promoted with a focus on delivering “21st Century” learners, enquirers and problem solvers. More recent engagement with understanding how children’s brains work through cognitive science has shown that the enquiry approach is not very effective.  
   
A knowledge-led or knowledge-rich curriculum puts the entitlement of knowledge to all pupils at its core.   
E. D Hirsh in his book *Why Knowledge Matters* describes knowledge as a type of mental Velcro, where people who have lots of subject-specific knowledge find it easier to make new knowledge stick, helping them to retain this knowledge in the long-term memory.2

This leads to the conclusion that the more prior knowledge you have the more new knowledge you are likely to learn compared to those with limited prior knowledge.   
  
The power of a knowledge-rich curriculum is more evident for those from disadvantaged backgrounds as they are less likely to come into school at each key stage with the same exposure to the available prior knowledge that their peers may have acquired through parents reading to them or through museum trips.

So what does a knowledge-rich curriculum look like?   
Tom Sherrington, author and educational consultant suggests that it should consist of four main components.3

1. Knowledge provides a driving, underpinning philosophy of the curriculum.

This means that the specific subject content is given high priority. The knowledge we want pupils to know is explicitly identified. Skills are considered to be a form of knowledge and skills are subject-domain-specific and cannot be taught generically. Knowledge is considered to be empowering for pupils and the implementation of the curriculum is the moral duty of teachers.

1. Knowledge content is specified in detail.

The curriculum explicitly states the knowledge that is to be taught. The level of detail is high and deviation from this knowledge is discouraged. Lessons are designed to focus on these and the knowledge is something tangible that can be written down, remembered, and applied. Knowledge specified in a knowledge-rich science curriculum is divided into two main areas -substantive and disciplinary.

1. Knowledge is taught to be remembered, not merely encountered.

A knowledge-rich curriculum embraces cognitive science, particularly around memory, forgetting and retrieval practice. These aspects are planned into the curriculum with thought so that pupils have plenty of opportunities to develop automaticity and fluency. The aim of the curriculum is for the knowledge to be stored in the long-term memory.

1. Knowledge is sequenced coherently.

Thought around the sequencing within each unit and across each year/key stage is considered. Big ideas are developed over time adding layers of information to existing knowledge. Common misconceptions are identified and pedagogical tools are considered for the delivery of the curriculum to develop mastery of each subject domain.

These four areas accurately sum up what a knowledge-rich curriculum should look and feel like in practice and Tom goes into much greater detail in his book The Learning Rainforest.

Being knowledge rich in science provides pupils with a great depth of interconnected knowledge that they can use to solve problems, have meaningful conversations and debates, pose their own questions and dig deeper into topics. This application of knowledge can only occur when mastery of the knowledge is achieved. It’s not rote learning and disconnected information, it’s the building of complex schema and providing children with their entitlement to the powerful knowledge human civilisation has acquired and making sure this knowledge is retained and accessible.

The Science team here at HIAS are working with many schools in both primary and secondary phase, developing a high-quality knowledge-rich curriculum. If you would like some support with your curriculum development then contact us via email.

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References

1HMCI commentary: curriculum and the new education inspection framework. Ofsted. <https://www.gov.uk/government/speeches/hmci-commentary-curriculum-and-the-new-education-inspection-framework>

2Hirsch, E.D. (2016) *Why Knowledge Matters. Rescuing Our Children from Failed Educational Theories.* Harvard Education

3Sherrington, T. 2018. *What is a Knowledge Rich Curriculum? Principle and Practice.* [*https://teacherhead.com/2018/06/06/what-is-a-knowledge-rich-curriculum-principle-and-practice/*](https://teacherhead.com/2018/06/06/what-is-a-knowledge-rich-curriculum-principle-and-practice/)