

Learning To Fly

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Knowledge is Power

Character is Key

Contents:

1. Welcome
2. Knowledge is Power
3. Knowledge is Power (cont.)
4. Literature review: D. McFaul
5. Literature review: D. McFaul (cont.)
6. Life after levels at KS3
7. Literature review A. Howe

Knowledge is Power

Why does knowledge give us power?

- **Knowledge underpins other learning:** in the first instance, knowing the meaning of words and having the ability to decode language is crucial for child development. Beyond that, factual knowledge is required to learn and practice skills. Having background knowledge in a subject allows links to be made, information to be 'chunked' and more information to be encoded into long term memory. "Memorising facts is like stocking a construction site with the supplies to put up a house. Building the house requires not only knowledge of countless different fittings and materials, but conceptual understanding too...mastery requires both the possession of ready knowledge and the conceptual understanding of how to use it" (*Brown, Roediger III, McDaniel*). The more information you already have in your long-term memory, the more new information you can retain. Knowledge is important not just in subjects that involve recall in written examinations. In art, a knowledge of formal elements such as line, tone, colour and pattern is important, as is a knowledge of artists from different contexts.
- **Cultural Capital:** knowledge allows students to be successful in exams so, in that sense, gives young people from less affluent backgrounds the opportunity to be successful. However, a focus on enhancing vocabulary and making sure students experience a knowledge rich curriculum provides students with cultural capital. Young people from more affluent backgrounds are likely to develop a broad vocabulary at home. They are also likely to learn common cultural reference points at home. These might include knowledge of the arts (the Renaissance, Dickens), historical figures or events (Chartism as part of our history of radical democratising forces or the impact of Keynesian economics on post-war Britain), linguistic turns of phrase ("modus operandi"). They are likely to know about a range of professional careers and know about university from a young age. It is hard for students from less advantaged backgrounds to take their places at prestigious institutions and in professional careers if they feel culturally or socially excluded.

Memory

Memory is the residual of thought; thinking hard is more likely to aid recall. There are two memory stores: working memory and long-term memory. Working memory helps make decisions. It processes the world around us and compares the sensory information with information from the long-term memory to help us make decisions. Our objective is to help students encode and retain information in the long-term memory. This will enable them to retrieve relevant information when necessary. Last minute cramming for exams attempts to encode information into the long-term memory but it is less effective because the cognitive load is too much. If nothing has changed in long-term memory, nothing has been learned. Below are the principles that we will use to support students in successfully encoding information into their long-term memories.

- There are no quick fixes, we must start early
- Initial learning should be carefully planned; engagement is vital and challenge appropriate but not demotivating
- Information must be revisited and rehearsed regularly; retrieving knowledge regularly is more effective than res-tudying at the end of a course
- Embedding these principles will be a departure from the way we have traditionally thought about constructing SOW and lesson plans; careful time and consideration must be given to embedding these changes. 'The most general and useful idea that cognitive psychology can offer teachers is to review each lesson plan in terms of what the student is likely to think about' (*Willingham*).

Initial learning

Below are effective ways to reduce cognitive load and create the optimal conditions for learning new material:

- Embed initial knowledge by making learning **memorable** and **engaging**. Research suggests that 20% of students in lessons behave well but are passive and not focused on the learning.
- Present new information in **small steps**. Provide worked examples and offer images and text at the same time so that the learner does not have to remember one part while processing the other. Dual coding is recommended.
- Provide cognitive work that poses **moderate challenge** – it must be easy enough to solve but difficult enough to take some mental effort.
- **Generation learning:** This idea centres upon asking students to 'generate' a response to a question or problem before being given the answer in class. For example, students could be given a problem as a starter or as a part

of a homework. The students would be asked to try and solve the problem before the answer is explored in the subsequent lesson. According to research, even if students are not able to generate the correct answer, the act of going through this approach will help deepen learning and therefore improve memory.

- **Elaboration:** This technique involves students giving learnt material meaning by expressing it in their own words and connecting it to what they already know. The more accomplished the student is at explaining how the material links to prior knowledge, the stronger their grasp of the topic will be. As a result, students will be able to make more connections with future information, thus improving their ability to remember the information later.
- **Self-explanation:** ask students to explain how new information is related to known explanation, or explain steps taken during problem solving.

Effective initial learning leads to higher quality retention and retrieval of information

Retention and retrieval

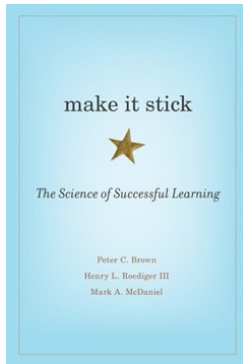
Students need to learn strategies that have the most impact in terms of supporting retention and retrieval of knowledge. For example practice testing, distributed practice, interleaved practice, elaborative interrogation, self-explanation. Spaced, interleaved and varied practice produces better mastery than massed practice. But these forms of practice are harder and so require more effort. Learning feels slower and rapid results and affirmations associated with mass practice are not evident. Students (and adults) labour under the misconception that we learn best through single-minded dogged repetition.

- Students should be encouraged to view testing as an opportunity to identify material of which they are not yet confident and not as something to be feared or begrudged. **Regular low-stakes testing** should be a feature in all SOW.
- **Interleaving** is a process where students mix, or **interleave**, multiple subjects or topics while they study in order to improve their learning. Rather than mastering one piece of information / concept etc. students are required to move quickly onto another, and then perhaps back. Traditionally, however, blocked practice has been common. This involves studying one topic very thoroughly before moving to another topic. At times interleaving seems especially counter-productive and confusing and is, therefore, seldom used. Just as students feel they have grasped a concept they are introduced to a new concept but the long-term benefits are evident. **The principles of interleaving should be applied to the construction of SOW and programmes of study.**
- **Varied practice** involves practising the same skill/knowledge in a different context rather than always practising it in the same context. For example, only ever applying the knowledge to a describe question, rather than applying the knowledge to an explain or a judgement question. The idea is that varied practice requires more brain power and *'encodes the learning in a more flexible representation that can be applied more broadly'* (Brown, Roediger III, McDaniel). This approach helps us adapt to new situations in an unpredictable world, if we don't vary our learning (eg always studying the same flashcards in the same sequence) then we will find it harder to adapt to a new situation.
- One idea based on the **elaboration** technique could be to get students to summarise the learning of a lesson or a unit in their own words at the end of a lesson or for homework. Certain key trigger words could be given, but the emphasis would be to get the students to summarise the information themselves.
- Greater time should be given to helping students 'file' information effectively so it can be transferred to long-term memory. **Mnemonics** and memory techniques are key, but it should be emphasised that such methods work best when the students have already acquired the knowledge rather than using the methods to learn the material for the first time.
- Creative use could be made of displays, classrooms, corridors to help students associate information using the **'memory palace'** technique (method of loci). For example, whole **narratives** could be constructed by staff and students to help students remember the structure of a module so that they have a framework to identify how individual pieces of knowledge fit into the bigger picture.
- **'Drilling'** – extended practice is important. Memory will not be built without hard work.
- **Use of song** – the use of music to help remember information is effective and a helpful tool for developing long-term memory.
- **Mindmaps** – Mind maps are a good way of retrieving information as the various branches of the diagram can act as prompts to help recall further information. The layout of the mind map also has the advantage over other note taking techniques because it helps students link material thereby deepening their understanding and memory of the topic.

'Make it stick: the science of successful learning'

Peter C. Brown, Henry L. Roediger III, Mark A. McDaniel

Review by David McFaul



The fruit of a collaborative project undertaken by two cognitive scientists and an author, this book explains how learning and memory work. Based on empirical research, the authors explore the experience of professionals from a variety of occupations to tell the stories of learners who have been successful at master-

ing complex knowledge and skills. One of the ideas outlined early on in the book is that the majority of learners misunderstand learning and use learning methods which are ineffective and only yield short-term gains. The authors argue that learners tend to be poor judges of when they are learning well and are all too likely to default to methods which are undemanding and bring quick results. For example, learners tend to favour rereading text. However, as the authors themselves state 'mastering the text is not the same as mastering the ideas within the text, which is why learners are often deceived about the benefits of rereading text'. Thus, the primary way most learners study is akin to 'writing in the sand', here today but gone tomorrow. Some time is given debunking the myths surrounding learning, including the belief that as learners, we have one preferred learning style and that repetitive massed practice is essential to mastering particular knowledge or skills.

Instead, the book presents a series of principles and practices which if employed consistently and conscientiously will lead to effective learning and help all learners understand, retain and deploy knowledge and skills long-term. The retrieval of knowledge and skills learnt is central to productive learning as it strengthens the memory and 'interrupts forgetting'. The authors thus explore a number of methods which will not only help learners retrieve information, but also help recode and consolidate information stored in our short-term memory to our long-term memory where it will be anchored securely. If this consolidation of information takes place then 'there is virtually no limit to how much

learning we can remember as long as we relate it to what we already know. In fact, because new learning depends on prior learning, the more we learn, the more possible connections we create for further learning'.

For retrieval to be meaningful and effective, it has to be 'effortful'. Learners should be expected to work hard to remember the path back to the required information. The more times the learner makes the path back to the particular piece of information, the easier it will be to find the path next time the information is needed. Specific methods advocated by the authors to help retrieval include **spaced, varied and interleaved practice**. Spaced practice involves leaving sufficient time between learning a particular skill/knowledge before testing to make the retrieval process harder. Varied practice involves practising the same skill/knowledge in a different context rather than always practising it in the same format. Interleaved practice whilst seemingly counter-productive, involves practising a skill or learning information until the point that students just begin to feel they have grasped the concept before they are then introduced to a new idea. Students find the process confusing, but the scientific evidence shows unequivocally that interleaved practice aids long-term retention. Considerable time is also spent outlining the importance of **generation learning, elaboration and reflection** as important learning devices. **Generation learning** is the act of trying to answer a question or solve a problem rather than just being given the answer, **elaboration** is defined as giving new material meaning by expressing it in your own words and connecting it to prior knowledge and **reflection** is evaluating the learning process in order to improve future learning.

In sum, 'Make it stick' is highly informative, very accessible and written in a format which promotes the very principles advocated throughout the book. Thus, the authors revisit the learning methods they discuss in a variety of contexts across the different chapters, drawing upon case studies from the classroom, to the military academy and from the boardroom to the aeroplane cockpit.

Knowledge is Power at JRCS 2018/19

- Students need to be taught the key principles of how to learn and equipped with the skills and methods to learn more effectively in and outside of the classroom. This approach has been introduced through assemblies for students and CPD for staff.. However, if we are to imbed the very principles outlined in the book, then these learning methods should be promoted by teachers in a variety of different subject contexts to reinforce the benefits of studying in this way.

The 12 Thinking Hard strategies

Knowledge and understanding	Analysis and application	Flexibility of thinking
1.Reduce/Summarising	5. Prioritise	10. Making connections
2. Transform	6. Categorise	11. Compare
3. Deconstruct	8. Criticise	12. Extend
4. Derive	8. Trends and patterns	
	9. Practice	

Autumn term —focus on retrieval and retention of knowledge

- Regular ‘low stakes’** testing has been developed and embedded into classroom practice. Testing should cover work from the prior lesson as well as work covered earlier in the term or the year. Testing should be regular and could consist of just four or five questions to check understanding of the core content at the start or beginning of a lesson at least once a week.
- Students should be encouraged to view testing as an opportunity to identify material of which they are not yet confident and not as something to be feared or begrudged.
- Transform**— use a picture, music, drama, diagrams and tables to transform text into something that students can remember. You were asked in CPD to draw a picture when listening to what living conditions were like in 19th Century cities. What can you remember?
- Mnemonics**—A *mnemonic* is a tool to help remember facts or a large amount of information. It can be a song, rhyme, acronym, image, or a phrase to help remember a list of facts in a certain order. Garry used GOAT in assembly to remember the animals show on the slide. What animals was he referring to?
- To implement the practice of **‘generation learning’**, students could be given a problem or challenge prior to a lesson and the h/w could focus on asking the students to try and solve the problem before the answer is explored in the subsequent lesson. According to research, this approach will help deepen learning and improve memory.
- One idea based on the concept of **elaboration** could be to get students to summarise the learning of a lesson or a unit in their own words at the end of a lesson or for h/w. Certain key trigger words could be given, but the emphasis would be to get the students to summarise the information themselves.
- Greater time should be given to helping students ‘file’ information effectively so it can be transferred to long-term memory. Mnemonics and memory techniques are key, but it should be emphasised that such methods work best when the students have already acquired the knowledge rather than using the methods to learn the material for the first time.
- For example, whole narratives could be constructed by staff and students to help students remember the structure of a module so that they have a framework to identify how individual pieces of knowledge fit into the bigger picture. More creative use could be made of displays, classrooms, corridors to help students associate information using the ‘memory palace’ technique. Remember what Dan Mercer took us through in CPD in 2018.

- **Reducing/summarising**— This is an extremely useful skill as students come face to face with pages of text each day. The need to be able to summarise the key learning points in a lesson. History and geography use summary boxes in their work booklets to allow students to do just that.

How Children Succeed – Confidence, curiosity and the hidden power of character. Tough, P. 2012

Review by Amy Howe

Is it nature or nurture that creates successful individuals? This is a question that has been puzzling academics for centuries. The widespread belief is that nature trumps every time. From the moment a child enters the education system they are tested, monitored and categorized. Their cognitive ability decides everything from which books they read to, at certain times, the subjects they can access. This is known as the cognitive hypothesis and it is based around the belief that success depends primarily on cognitive skill. IQ tests are the best indicator for future success and the way to safeguard this is to practice skills and recall knowledge as regularly as possible.

So with this level of intervention and review why do so many able students fail to fulfil their potential? There is no doubt that they have the intellectual capacity but for some reason they fail to perform. Is this purely down to circumstances? Have their teachers taught the wrong things? If that were the case why do their classmates achieve when they don't?

Maybe, just maybe IQ alone does not guarantee success.

In the book 'Tough' the author reviews cutting edge research into neuroscience, paediatrics, psychology and economics. He also reflects on his time in several American educational establishments ranging from the most disadvantage to the most affluent. Using all this evidence he answers, with authority, the burning question of why some children succeed when others fail with one word, character

"Economists refer to these as noncognitive skills, psychologists call them personality traits, and the rest of us sometimes think of them as character" (Introduction)

Character, not cognition, is central to success and character can be taught. Tough believes that the inner resources in a child count more than any amount of extra teaching support or interventions. However, he does state that the development of character can be divided into two categories:

Moral character – which embodies ethical values such as gratitude

Performance character – which helps students to be the best they can be

So what are the skills that are believed to make a real difference to student outcomes?

According to Toughs research there are 7:

1. Self-control
2. Zest
3. Social intelligence
4. Gratitude
5. Optimism
6. Curiosity
7. Grit (his favourite)

"Here is one way of looking at character. It can function as a substitute for the social safety net that students with a strong parental attachment enjoy. If you don't have that you need to compensate in other ways. To succeed, you need more grit, more social intelligence, more self-control than wealthier kids" (p103)

There is no denying that children who have been exposed to the ACE factors (adverse childhood experiences) are more likely to fail in education and suffer complex and life limiting health conditions. There is vast research available to support this. This is regardless of socioeconomic groupings. But Tough goes further than this. The author believes that in order to develop the 7 skills students need to be exposed to failure. In an education system that is built upon examinations and end tests, do we give them the opportunity to learn, reflect and improve? Maybe this is not feasible towards the end of their school career but what about along the way? He believes that it is our job as educators to provide a rich, supportive experience for students where it is ok to fail. Failing, reflecting and rebuilding is the best way to develop character.

A key theme all the way through the book is that students are attracted to individuals who give them self-belief and develop their sense of optimism. The type of people who make students feel that they can do anything if they put their minds to it. It doesn't matter about your target grade, if you work hard and anything is possible.

"And every day they pull themselves up one more rung on the ladder to a more successful future. But for the rest of us, it's not enough to just applaud their efforts and hope that someday, more young people follow their lead. They did not get onto the ladder alone. They are there only because someone helped them to take the first step" (P197)

This book really does support the idea that every child needs a champion.

