



Adaptive Skill – a commentary

Are we training teachers to develop 'routine expertise' or adaptive expertise?

I believe that the key to effective teaching is the capacity to *adapt, generalise and transform* knowledge, particularly in recognising a pedagogy that embraces difference. How can we better train teachers to develop adaptive skills? What is the implication of developing adaptive skills in the training of new teachers and for inclusive teaching?

The science of learning: Where are the shortfalls?

My frustration with the current vogue for cognitive psychology is a peevish one. I'm delighted that it is now a focus for school CPD but am frustrated by its misuse. Cognitive psychology has been the basis for understanding the needs of the increasingly more complex profile of young people with learning difficulties that we see represented more and more in our classrooms today. SENCOs are familiar with working memory and challenges it brings for children. They are familiar with cognitive overload, aware of the need to space learning, to practise retrieval and to scaffold learning.

However, the recent focus of cognitive science in schools has not been to understand how to support learning difference better, but rather to teach 'typical' learners. The effort is on ensuring more content can be covered and more information embedded into long term memory, rather than to enable and ensure that through understanding better how children learn, we can ensure ALL children have equitable access to the curriculum and consequently to learn well.

I am now focusing on cognitive science research in relation to the Defence industry! My interest was piqued by an article from Paul Ward et al (2018) funded by the US MoD (bear with)! They reviewed the challenge of complex operational environments that are *ever changing and unpredictable*. They considered the need for experts (soldiers going into combat) who not only possess the required domain expertise as traditionally defined, but who can also quickly adapt to situational change. In such situations the practitioner would need to be skilful in carrying out the routine aspects of their work and equally able to adapt effectively in unexpected or novel situations (Hoffman 1998). A perfect description of a teacher and her classroom I thought!

How can we build Adaptive Expertise in teachers?

So, what can this research tell us about how we best develop expertise? However, we define an expert, Ward et al argue that the key characteristic of expertise is adaptive skill. The US MoD is interested in developing these skills for dealing with future conflict, the nature of which is likely to be highly uncertain and present new and unpredictable challenges. As someone who advocates for better development opportunities for teachers to ensure inclusive experiences for all pupils, adaptive teaching is something I recognise we need to do better.

Ward et al conducted a literature review exploring recognised concepts of adaptive skills such as *transfer, flexibility, cognitive rigidity, cognitive agility, and creativity*. This then led to identifying some additional concepts including *metacognition, self-efficacy, motivation, teams and tolerance for ambiguity* (music to my ears). They established a database of 140 publications related to expertise and adaptation. The empirical evidence was mostly related to transfer of knowledge rather than adaptive



skill but there was some helpful insight in the use of the term 'adaptive expertise' coined by Hatano and Inagaki (1984/86), whose work is focused on differentiating adaptive from routine expertise.

Routine task execution was described as being based on procedural knowledge or skill. Mastery of that procedure – or routine expertise – was described as being outstanding in terms of speed, accuracy and automaticity of performance. Yet, because the procedures associated with routine expertise were limited to near transfer, they concluded that routine experts 'lack flexibility and adaptability to new problems.' Others (Hoffman 1998) argue against this, seeing expertise as being adaptive by default (but for me, here lies an important distinction that cannot be assumed).

For Hatano and Inagaki, adaptive experts perform procedural skills efficiently but also have a strong conceptual understanding of those procedures and associated contexts. They demonstrate context-sensitive strategy. For Hatano and Inagaki, conceptual understanding of procedural skill allows for in-event adaptive thinking. So many educational examples spring to mind here – where procedural methods are adopted but conceptual underpinning is not understood – e.g., lollipop sticks for AfL or giving blu tack to a child who is finding it difficult to concentrate. Without a real understanding of purpose.

Ward et al went further in their quest to identify an explanation for adaptive skill and looked next to Cognitive Flexibility Theory (Spiro et al 1992)

“Move over Cognitive Load Theory; here comes Cognitive Flexibility Theory!”

Cognitive flexibility is the ability to represent knowledge from different conceptual and case perspectives to address the relevant problem-solving situation at hand.

Now here is the interesting bit in their findings. In order for knowledge to be useful (i.e. accessible and available to draw upon and apply in a myriad of situations) it has to be experienced, acquired, taught, organised and represented in multiple ways.

Spiro et al argue that when knowledge is not acquired flexibly, its use is limited to situations that resemble the initial learning context, which constitutes a fraction of the situations where that knowledge may be applicable. When knowledge structures are acquired flexibly, knowledge assemblies can be built 'to fit the diverse future cases of knowledge application in that domain'.

Frequently, the understanding of complex systems is biased by the reductive tendency to simplify with respect to the dimensions of difficulty (eg static, non-interactive, sequential, linear). Ward et al say this reductive tendency is an inevitable consequence of learning – since understanding of anything complex will always be incomplete at any given time. This is particularly limiting when we consider the reluctance to train new teachers about complexity – if we stick to reductive simplicity, we reduce their capacity to transfer and apply, limiting their domain expertise.

Knowledge shields: challenging misconceptions

Another phrase was new to me in this research was the term 'knowledge shields'. Feltovich et al (2001) refer to the tendency of practitioners to preserve misconceptions defending their beliefs. What was so interesting about this was not



only the importance of cognitive flexibility to overcome misconceptions but the view of Spiro & Feltovich that simply unlearning misconceptions is not helpful, they advocate better teaching of complexity. Again, placing an important emphasis therefore on teaching adaptive skill for early practitioner development.

How do we execute flexible thinking?

Flexible execution or 'flexicution' – a way of capturing the process of re-planning when faced with unforeseen circumstances. The flexicution model is the process of adaptive planning or replanning when faced with the dynamics of the real world.

Flexicution is therefore a continuous activity of adaptive performance.

Flexicution is the response adopted when faced with the unplanned or unexpected. In the case of a teacher the opportunity to practice flexicution will support teachers to feel they can embrace the unknown, expected to be surprised by their students.

Can you imagine ITT embracing a model of flexicution within the cycle of learning? Embracing ambiguity, prepared to be surprised by pupils, having high expectations, without preconceived limits of pupil ability.

Training new teachers to be adaptive from the outset

These various models help shape a scientific view of what principles of training should be developed if we are to grow expertise for teaching everyone, particularly those who find learning difficult.

Ward et al suggest six training principles for accelerating proficiency through the development of adaptive skills:

1. Feedback to overcome cognitive rigidity.
2. 'Concept case coupling' supporting the practice of adaptation by connecting case studies relating to learning (cognition) and applying to complex situational scenarios.
3. A focus on the toughest cases – those that are rare; high needs/low frequency.
4. Calibrating training to challenge mental models just beyond the comfort zone. Facilitated by expert mentors who guide and provide active learning experiences.
5. Preserving complexity in the face of changing demands and goals
6. Active reflection; practitioners recognising their own skills, knowledge and understanding.

This research provides some interesting infrastructure for thinking about what should be a priority for training of teachers to develop proficiency. The recommendations are complex but resonate with what we recognise is needed to support increasing diversity and complexity of learners and learning.



Key reference

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