INSTITUTE FOR TEACHING

Expert Teaching

What is it, and how might we develop it?

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1. Introduction

Teaching quality is important. It is arguably the greatest lever at our disposal for improving the life chances of the young people in our care (Hattie, 2015), particularly for those from disadvantaged backgrounds (Wiliam, 2016).

When the quality of a teacher's practice reaches a certain level, we might begin to describe it as *expert teaching[1]*. However, we don't yet have a clear consensus around what this entails, and until we do, our capacity to systematically develop it will remain limited.

This paper attempts to pull together the best available evidence from education and beyond, to offer a coherent, high-level overview of what expert teaching is, and how we can develop it. It has been produced to share our thinking, guide our programme design, and stimulate conversation around the nature of expertise in teaching.

Thank you to everyone who has generously provided feedback on this paper to date[2]. All errors that remain are mine. If you have any questions, comments or suggestions, please do get in touch – we'd love to hear from you.

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[1] We talk about expert teaching rather than expert teachers because we believe that teachers are made, not born (Hood, 2017).
[2] Including: Kris Boulton; Danny Brown; Hannah Cheetham-Joshi; Harry Fletcher-Wood; Marie Hamer; Matt Hood; Ben Riley & David Weston.

2. Expertise as Impact

There are several ways we might begin to think about expertise in teaching. The first is to consider teacher impact: *the influence that teachers have on what their pupils think, do and achieve*.

The precise nature of this intended impact is a subject open to debate, and so we must recognise that any definition of effective teaching is contingent on the assumptions we make about the *purpose of education*.

This is an important topic, but not one we can tackle fruitfully in this paper. Instead, let's fall back on one of the most widely accepted assumptions in the field: that the overriding task of teaching is to *enable pupil learning*. There is of course also debate around what constitutes learning (Willingham, 2017a), but there is sufficient consensus to enable us to proceed.

From this perspective, we could argue that expert teaching consistently enables rapid and robust pupil learning, and seek to define this in measurable terms. This is an attractive definition, because it focuses on the thing we are interested in changing. However, for several reasons, it is only partially useful:

1.   Like defining a great runner as someone who runs fast, it describes only the outcomes of expertise, not the factors that contribute to these outcomes. As such, it lacks the explanatory power we need to guide teacher development.

2.   Student achievement is subject to multiple influences. Teaching accounts for only a small proportion (perhaps 20-30%) of the variance in student achievement (Muijs & Reynolds, 2017). Rapid and robust pupil learning is only a likely, rather than guaranteed outcome of expertise[3] (Papay, 2011).

3.   Measuring teacher impact is challenging. The tools we use to evaluate it are currently not sophisticated enough to make high stakes inferences about single teachers in single classrooms (AERA, 2015).

For a more useful definition we must look at the problem from a further perspective: what teachers actually do to generate this impact.

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[3] Even then, this relies on having valid tools for measuring student progress, not an easy challenge to surmount (Christodoulou, 2017).

3. Expertise as Action

The following four aspects of behaviour enable expert teachers to have great impact:

3.1 Perception

Expert teachers see their classrooms in a qualitatively different way (Glaser, 1996). Like the football goalie who focuses on an attacker's posture to anticipate where they will kick, expert teachers are adaptively attuned to the most critical movements of their classrooms[4]. They perceive events at a deeper level of abstraction, focusing almost exclusively on cues that allow them to make inferences about student progress (Findell, 2009). They can be distinguished as much by what they do not attend to as what they do (Miller, 2011).

3.2 Simulation

Expert teachers are able to accurately simulate the consequences of various actions and events across a range of familiar situations. This enables them to anticipate what might happen well in advance, and so to make the most effective professional judgement (Westerman, 1991). They are constantly several steps ahead of their pupils (and others), and as a result, their lessons often appear to just happen (Berliner, 2004).

3.3 Execution

Although they tend to do less than their colleagues (Schempp, 2002), and sometimes take longer to arrive at a diagnosis (Sternberg & Horvath, 1995), expert teachers consistently select the rootmost impactful interventions across a wide range of situations (Ball et al., 2008). They are often more flexible and opportunistic in their choice of action (Berliner, 2004), and execute routinely with fluency and precision (Hattie, 2003).

3.4 Conservation

Expert teachers conduct much of their practice on 'automatic pilot', enabling them to: devote significant mental resources toward monitoring the complex, chaotic environment of the classroom (Miller, 2011); focus executive control towards the most important teaching processes (Sternberg & Horvath, 1995); and tackle unexpected problems as they arise. As a result, they are highly sensitive to, and can keep track of (and better remember) multiple changes in the tasks and behaviours of pupils, even when engaging with individuals (Clarridge & Berliner, 1991; Woolf et al., 2017).

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[4] Although they may not always be consciously aware of what they are looking at (Miller, 2011).

4. Expertise as Mental Models

Appreciating what expert teachers do differently is helpful in some ways. It makes it easier to recognise expertise when we see it. However, an action definition still doesn't give us the secure footholds we need to develop expertise. For that, we need to look deeper still, towards one of the root causes of teacher behaviour: their mental models. Mental models refer to what people know and how this knowledge is organised to guide decision and action (Schempp, 2002). They are a powerful way of thinking about expertise, and teacher development in particular, because they sit at the start of the causal chain of teacher effects. Knowledge guides action which influences impact[5].

4.1 What do expert teachers know?

As teachers move from novice to expert, they develop increasingly powerful mental models in the following broad domains:

- **Path** – Knowledge of the pathway towards mastery of a curriculum, including: the concepts and process that pupils need to know at different stages of their journeys; how these are best represented and sequenced (Hattie, 2003; Westerman, 1991); as well as common obstacles to progress (Sadler, 2016).

- **Pupil** – Knowledge of what their pupils know and don't know, what motivates and concerns them, and how these things change over time (Berliner, 2004, Schempp, 2002). The development of pupil knowledge is produced (and limited) by teacher assessment knowledge (Christodoulou, 2017; Wiliam, 2016).

- **Pedagogy** – Knowledge of how learning works and how to catalyse it. This area draws on fields such as cognitive and behavioural science (Deans for Impact, 2015) as well as personal experience, to help teachers build a mental model of the learner (Willingham, 2017b). It encompasses cognitive, emotional, social and cultural dimensions of learning.

- **Self-Regulation** – Knowledge of how to analyse, evaluate and iterate their own knowledge and action towards increasing impact (Ericsson, 2015; Hattie, 2012). This includes an awareness of their own cognitive biases and how to mitigate them.

Reduce the power of any of these domains and teacher impact declines accordingly. For example, if you ask an expert to teach a different subject (Sternberg & Horvath, 1995) or year group (Kini & Podolsky, 2016), or even give them a new group of pupils (Berliner, 1994), they are no longer likely to enable exceptional outcomes. Expertise is highly domain-specific. Even the PE teacher who is proficient at teaching fitness may be woefully lacking when it comes to teaching racket sports (Berliner, 2004).

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[5] Causal links also exist in the opposite direction, but these are smaller for experts (Kalyuga et al., 2012). For example, the way a teacher behaves can influence their beliefs (Didau & Rose, 2016).

4.2 How is expert teacher knowledge organised?

Expertise is a result of not just what teachers know, but how that knowledge is organised to guide perception, decision and action. The mental models of expert teachers are:

- **Extensive** – They have a comprehensive, connected and evidence-informed understanding of the domains outlined above (Ericsson & Pool, 2016).

- **Actionable** – This knowledge is knitted together with an appreciation of their local context, alongside the cues they routinely encounter through pupil interaction (Schmidt, 2007).

- **Fluent** – The vast majority of this knowledge can be accessed and employed rapidly, and with minimal effort [6] (Findell, 2009).

- **Meaningful** – Expert teacher knowledge is threaded with their personal and professional values. They care deeply about their craft, and about elevating the life chances of their pupils (Schempp, 2002). As a result, they take full responsibility for their actions (Berliner, 2004), and are driven to continually improve their practice (Hattie, 2003).

Combined, these organisational features of mental models enable teachers to act in the ways described in Chapter 3, and so effectively tackle the most persistent problems they face in everyday practice.

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[6] The automatic nature of this knowledge also means that expert teachers are not always aware of, or able to fully articulate what they are doing (Elliot, 2015). It can also be hard for them to make and sustain significant changes to their knowledge and habits (Wiliam & Leahy, 2014).

5. Developing Expert Mental Models

Developing teacher expertise is largely a process of helping teachers build their mental models in the domains outlined above. Certain aspects of this knowledge unfold fairly naturally through experience (Allen & Sims, Forthcoming). These tend to be behaviours which have a longstanding role in our evolutionary history as a species (Geary, 2007), are easy to imitate (Kini & Podolsky, 2016), and offer fairly immediate and tangible feedback[7]. For example, building trusting relationships with pupils.

However, there are also aspects of expert mental models that we are much less likely to develop through experience alone. Particularly those that are unintuitive, hard to measure, and demand judicious use (Rohrer & Pashler, 2016). For example, interleaving practice (Brown et al., 2014) and delayed feedback (Fletcher-Wood, 2017). To develop these kinds of models, our best bet is to be intentional in supporting teachers to:

1. **Study** – Build an evidence-informed understanding of how these things work.

2. **Practise** – Put this evidence to work in their context, and repeatedly implement towards fluency and fidelity (Schmidt & Rikers, 2007).

3. **Iterate** – Continually evaluate (against pupil impact) and improve their mental models and actions.

Not all study, practice and iteration is equal. Crafting professional learning experiences that have an impact on what teachers know and how they act, and that have an impact on pupil learning is rare to achieve (Coe et al., 2014; IES, 2016). We can give ourselves the best possible chance of success by ensuring our training is:

1. **Problem oriented** – Experiences should be framed and constructed around the most persistent problems teachers face (Kennedy, 2016a).

2. **Incrementally sequenced** – Manageable chunks of high-leverage mental models are navigated in a gradual, cumulative order, towards a clearly specified and measurable[8] prototype of expertise (Deans for 8 7 8 7 Impact, 2017). Each area is deconstructed, represented and practised with purpose until change takes hold (Kennedy, 2016b; Wiliam & Leahy, 2014).

3. **Supportively Stretching** – Each step in the sequence must challenge existing knowledge and practice, pushing teachers out of their comfort zone (Deans for Impact, 2017) and expose them to a variety of application situations (Woolf et al., 2017). This process is best supported by an expert teacher educator who can provide bespoke direction, prompt reflection, offer timely feedback and generate accountability in socially sensitive ways (Kraft et al., 2016; Wiliam & Leahy, 2014).

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[7] Pupils often make greater progress when practice is interleaved, despite learning slower and making more errors in the short term. Providing feedback too quickly at certain points in the learning process can act as a redundant crutch and inhibit learning.
[8] This is not easy to do for teaching. See our forthcoming Evaluating Expertise paper.

4. **Socially situated** – Teachers benefit from conducting aspects of their learning alongside peers pursuing similar goals. This provides opportunities for sense-making, co-planning, identity development and peer accountability (Kraft & Papay, 2014; Wiliam & Leahy, 2014). These interactions are most effective when participating teachers focus on what their pupils are learning and why (Popp & Goldman, 2016; Vescio et al., 2008).

5. **Frequent and sustained** – For these experiences to generate the depth and fluency required for expertise, they must become a habitual part of teachers' professional lives, and be sustained over multiple years (Cordingley et al., 2015; Gardner et al., 2012). Provided there is relative stability in the subjects and phases being taught (Kini & Podolsky, 2016), and participants 'opt' or 'buy' in to the process (Kennedy, 2016b), current estimates suggest that teaching expertise may begin to emerge after 7 to 10 years of participating in the kinds of study, practice and iteration outlined above[9] (Berliner, 2004; Ericsson & Pool, 2016).

As teachers develop in expertise, the support they require reduces. Their mental models become sufficiently sophisticated to guide their own learning. As this happens they benefit less from explicit models and more from being exposed to relevant problems of practice (Kalyuga, et al., 2012).

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[9] The amount of practice required appears to vary substantially between individuals (Hambrick et al., 2014)

Further Reading

The following papers are a useful next read for anyone interested in diving deeper into expert teaching:

1. Describing the Behavior and Documenting the Accomplishments of Expert Teachers by David Berliner (2004). An overview of what expertise in teaching looks like.

2. Practice with Purpose: The Emerging Science of Teacher Expertise by Deans for Impact (2017). A concise summary of how deliberate practice might be leveraged for teacher development.

3. How expertise develops in medicine: knowledge encapsulation and illness script formation by Schmidt & Rikers (2007). A model describing how expertise is developed in medicine.

References

AERA (2015) AERA Statement on Use of Value-Added Models (VAM) for the Evaluation of Educators and Educator Preparation Programs. Educational Researcher, 20(10), p. 1–5.

Allen, B. & Sims, S. (Forthcoming) The Teacher Gap.

Berliner, D.C. (2004) Describing the Behavior and Documenting the Accomplishments of Expert Teachers. Bulletin of Science, Technology and Society, 24(3), p. 200–212.

Brown, P., Roediger, H. & McDaniel, M. (2014) Make It Stick: The Science of Successful Learning. Harvard University Press.

Christodoulou, D. (2017) Making Good Progress: The future of Assessment for Learning. OUP.

Clarridge, P.B. & Berliner, D.C. (1991) Perceptions of student behaviour as a function of expertise. Journal of Classroom Interaction, 26, p. 1–8.

Coe, R., Aloisi, C., Higgins, S. & Major, L.E. (2014) What makes great teaching? Review of the underpinning research. The Sutton Trust. Available at: https://goo.gl/ZxzTWV. 9

Cordingley, P., Higgins, S., Greany, T., Buckler, N., Coles-Jordan, D., Crisp, B., Saunders, L., Coe, R. (2015) Developing Great Teaching: Lessons from the international reviews into effective professional development. Teacher Development Trust. Available at: https://goo.gl/YHcvUk

Deans for Impact (2015) The Science of Learning. Available at: https://goo.gl/VpUw1y

Deans for Impact (2017) Practice with Purpose: The Emerging Science of Teacher Expertise. Available at: https://goo.gl/jh8N4Z

Didau & Rose (2016) What Every Teacher Needs to Know About Psychology. John Catt.

Elliott, J.G. (2015) Teacher Expertise. In: Wright, J. (ed.) International Encyclopedia of the Social & Behavioral Sciences, 24(2), p. 56–59.

Ericsson, K.A. (2015) Acquisition and Maintenance of Medical Expertise. Academic Medicine, 90(11), p. 1471–1486.

Ericsson, A. & Pool, R. (2016) Peak: Secrets from the new science of expertise. Bodley Head.

Findell, C.R. (2009) What Differentiates Expert Teachers from Others? The Journal of Education, 188(2), p. 11–24.

Fletcher-Wood, H. (2017) The evidence on feedback: a decision tree [Blog post] Improving Teaching. Available at: https://goo.gl/DXLmvK

Gardner, B., Lally, P. & Wardle, J. (2012) Making health habitual: The psychology of 'habit-formation' and general practice. British Journal of General Practice, 62(605), p. 664–666.

Geary, D.C. (2007) Educating the evolved mind: Conceptual foundations for an evolutionary educational psychology. Available at: http://goo.gl/ZqG4kS

Glaser, R. (1996) Changing the agency for learning: acquiring expert performance. In: Ericsson (Ed.), The road to excellence: the acquisition of expert performance in the arts and sciences, sports and games, p. 303–311. Hillsdale, NJ: Lawrence Erlbaum.

Hambrick, D. et al. (2014) Deliberate practice: Is that all it takes to become an expert? Intelligence, 45(1), p. 34–45.

Hattie, J. (2003) Teachers Make a Difference: What is the research evidence? Paper presented at ACER Research Conference, Melbourne, Australia. Available at: https://goo.gl/PrppRm

Hattie, J. (2012) Visible learning for teachers: Maximising impact on learning. Routledge. 10 Hattie, J. (2015) What Works Best in Education: The Politics of Collaborative Expertise. [Report] Pearson. Available at: https://goo.gl/9zOdqY

Hood, M. (2017) Performance Teaching. [Radio programme] Four Thought, BBC Radio 4. Available at: https://goo.gl/VqODzr

IES (2016) Does content-focused teacher professional development work? Findings from three Institute of Education sciences studies. [Brief] NCEE. Available at: https://goo.gl/RXCdBP

Kalyuga, S., Rikers, R. & Paas, F. (2012) Educational Implications of Expertise Reversal Effects in Learning and Performance of Complex Cognitive and Sensorimotor Skills. Educational Psychology Review, 24(3), p. 313–337.

Kennedy M.M. (2016a) Parsing the practice of teaching. Journal of Teacher Education, 67, p. 6–17.

Kennedy, M.M. (2016b) How Does Professional Development Improve Teaching? Review of Educational Research, 86(4), p. 1–36.

Kini, T. & Podolsky, A. (2016) Does Teaching Experience Increase Teacher Effectiveness? A Review of the Research. Learning Policy Institute. Available at: https://goo.gl/G6HQ4W

Kraft, M.A., Blazar, D. & Hogan, D. (2016) The Effect of Teacher Coaching on Instruction and Achievement: A Meta-Analysis of the Causal Evidence. [Working Paper] Brown University. Available at: https://goo.gl/4v22jF.

Kraft, M.A. & Papay, J.P. (2014) Can professional environments in schools promote teacher development? Explaining heterogeneity in returns to teaching experience. Educational Evaluation and Policy Analysis, 30(4), p. 476–500.

Miller, K. (2011) Situation Awareness in Teaching: What educators can learn from video-based research in other fields. In: Sherin, M., Jacobs, V., Philipp, R. Mathematics Teacher Noticing: Seeing Through Teachers' Eyes.

Muijs, D. & Reynolds, D. (2017) Effective Teaching: Evidence and Practice. Sage.

Papay (2011) Different Tests, Different Answers: The Stability of Teacher Value-Added Estimates Across Outcome Measures. American Educational Research Journal, (48)1, p. 163–193.

Popp, J.S. & Goldman, S.R. (2016) Knowledge building in teacher professional learning communities: Focus of meeting matters. Teaching and Teacher Education, 59, p. 347–359.

Rohrer, D. & Pashler, H. (2016) Recent Research on Human Learning Challenges Conventional Instructional Strategies. Educational Researcher, 39(5), p. 406–412. 11

Sadler, P.M. (2016) Understanding Misconceptions: Teaching and Learning in Middle School Physical Science. American Educator, 2016, p. 26–32.

Schempp, P., Tan, S. & McCullick, B. (2002) The practices of expert teachers. Teaching and Learning, 23(1), p. 99–106.

Schmidt, H. & Rikers, R. (2007) How expertise develops in medicine: knowledge encapsulation and illness script formation. Medical Education, 41(12) p. 1133–1139.

Sternberg, R.J. & Horvath, J.A. (1995) A prototype view of expert teaching. Educational Researcher, 24(6), p. 9–17.

Vescio, V., Ross, D. & Adams, A. (2008) A review of research on the impact of professional learning communities on teaching practice and student learning. Teaching and Teacher Education, 24(1), p. 80–91.

Westerman, D.A. (1991) Expert and Novice Teacher Decision Making. Journal of Teacher Education, 42(4) p. 292–305.

Wiliam, D. & Leahy, S. (2014) Sustaining Formative Assessment with Teacher Learning Communities. [Report] Dylan Wiliam Centre. Available at: https://goo.gl/xzB87C.

Wiliam, D. (2016) Leadership for Teacher Learning: Creating a Culture Where All Teachers Improve So That All Pupils Succeed. Learning Sciences International.

Willingham, D. (2017a) On the definition of learning… [Blog post] Science & Education. Available at: https://goo.gl/XR18Ga.

Willingham, D. (2017b) A Mental Model of the Learner: Teaching the Basic Science of Educational Psychology to Future Teachers. Mind, Brain and Education, 11(4), p. 166–175.

Wolff, C.E., Jarodzka, H. & Boshuizen, H.P.A. (2017) See and tell: Differences between expert and novice teachers' interpretations of problematic classroom management events. Teaching and Teacher Education, 66, p. 295–308.