

MODULE: **EXPLORE**

EVIDENCE SUMMARY



Guiding questions

Before you continue, consider:

- How do you currently diagnose needs for professional development in your school?
- How do you currently consult evidence to identify a solution?
- To what extent does your current process for implementing change include the opportunities to do both?

Evidence summary

Leona joined her all-through school in January as whole-school professional development lead. She is planning professional development for the following academic year, working with the senior leadership team to ensure it aligns to whole-school priorities. The school's exam outcomes, from key stage 2 to key stage 5, have been below national average for the past three years. Speaking to heads of subject and phase leads, pupils appear to be struggling to recall key knowledge, frequently forgetting ideas they appear to have learnt in lessons when they do assessments. The feedback from the mid-year staff survey confirmed that teachers in general feel that this is a problem, and this is corroborated by analysis of selected questions in summative assessments. However, before she can start to think about a solution, Leona first needs to know more about the problem. How might she go about this?

Leading school improvement

When thinking about school improvement, it can be beneficial for leaders to reflect on their theory of change. Leona remembers from course 1 that a theory of change is an outline for the steps needed to achieve a long-term goal. It ensures teacher educators start with 'why' and then plan backwards, considering 'what' they will do and 'how' they will monitor their impact in pursuit of their goals, connecting together each step logically. A theory of change helps leaders to be more intentional about leading school improvement.

Leona knows that different leaders might take a different approach to addressing pupils' difficulties in retaining key knowledge depending on their theory of change, because their school contexts will be different – perhaps the underlying school culture or levels of staff expertise are different. For example, Leona is confident in her teachers' understanding and application of foundational aspects of cognitive science such as the limits of working memory, whereas teachers in another school might be less familiar with this; in either case this would impact on what Leona decides to do. Reflecting on her theory of change helps Leona to ensure the decisions she makes about what to implement are in harmony with her school improvement goals.

But before Leona can consider what to implement, she needs to make sure she fully understands the problem across the school. Understanding the problem is the first step within a structured process of implementation that Leona can follow. This process comes from

the Education Endowment Foundation's (EEF) Guide to Implementation: Explore, Prepare, Deliver, Sustain (EEF, 2019). Each of these stages will be covered in more detail throughout this course, starting with Explore.

Picking the right problem

"Don't jump to considering new approaches to implement before rigorously examining the problem." (EEF, 2019, p.12)

Effective implementation begins by accurately diagnosing the problem. It should be a problem that teacher educators have some influence over, not one that is beyond their control to resolve. It should be a problem that is important to fix, for instance, one that if fixed would promote greater learning. And it should be a problem that is in line with the school's long-term strategic direction, otherwise, it is at risk of being under-resourced or abandoned. The problem should be solvable, salient, and strategic.

From the combination of existing assessment data and the teacher voice survey, Leona has an indication that pupil retention of knowledge is a problem which meets these three benchmarks. But she does not yet know enough about the problem to act effectively: "are all pupils struggling to retain knowledge?", "what sort of knowledge?" and "what is being done already to tackle the problem?" are just three questions she needs to be able to answer first. Leona ought to use a robust diagnostic process, collecting and analysing internal data, to learn more before introducing any new changes.

How should Leona approach this task so that she can build up a clearer picture of the potential problem?

- **Test hypotheses**, do not data-mine: teacher educators should start with a set of predictions, rather than seeking out what patterns appear within the data. The more data teacher educators have, the more probable it is that they will encounter random, spurious patterns which, if left unquestioned, can lead them to make incorrect assumptions (this is sometimes referred to as apophenia or patternicity).
- **Triangulate**, do not isolate: both corroboratory and contradictory data can tell teacher educators something. One piece of data, even if it supports a prediction, might be an outlier. However, not all data is the same: some data, such as national assessments, allow teacher educators to make stronger claims than others.
- **Focus on trends**, do not look to flatten every blip: stubborn, historical problems may be worth a leader's attention more than a blip. For example, if a school experiences an unusually low set of exam results, statistically speaking they will probably see an improvement the following year even if they do not deliberately do anything different: this phenomenon is called regression to the mean.

Leona's hunch was that pupils may not be spending enough time on important topics, or that the curriculum failed to return to them after they were first taught and that this was leading to forgetting. To her surprise when she sat down with subject and phase leaders to review curricula this was not the case; each curriculum carefully planned to revisit important topics at multiple points. This suggested that the cause of pupils' poor retention was more likely to be related to pedagogy than curriculum planning. Leona also knew from lesson observation data that, although there was room for improvement, in general teachers provided clear models and were systematic in checking for understanding before moving on within lessons. However, teachers didn't seem to spend time in lessons making sure that pupils could retrieve previously learned content. Leona knows that retrieval is an effective way of improving the durability of memories – perhaps this is the area to focus on.

To help her understand what exactly to focus on she decided to spend more time with the early years foundation stage (EYFS) and key stage 1 leads as results in this area of the school were consistently well above national averages – here pupils were clearly remembering what they were taught. Leona was struck by the amount of retrieval that pupils were doing in lessons – staff were constantly asking and prompting pupils to recall things they had previously learnt. Speaking to the phase leads it was clear this was no accident – they explained how opportunities to recall core content were planned out over the year and within each lesson. This approach was also embedded in how teaching assistants supported pupils in small groups (EEF, 2018a).

Leona is now confident that she has a solid understanding of the problem – she needs to help teachers get into the habit of having pupils systematically retrieve core knowledge in lessons. She's seen this work well in EYFS and key stage 1, but she knows that this will look different in key stage 2, let alone key stage 5. How might Leona select the right solution?

Pause. Reflect. Respond.

1. Which of these three approaches – test hypotheses, triangulate, and focus on trends – do you currently already do?

2. For any of the above that you do not currently do, can you think of an example of when you might do this in the future?

Selecting the right solution

"We advocate for a culture in which the status of evidence is normalised in decision-making, a world in which it would be considered simply wrong for professionals working in education not to have deep knowledge of rigorous and relevant research evidence" (Coe & Kime, 2019, p.4)

Effective implementation requires teacher educators to make evidence-informed decisions on what to implement. Teacher educators need to draw on both external evidence, such as research, and internal data from their own context about what has, and has not, worked in the past in order to come to a sensible solution. Internal data is not always as reliable as external data (EEF, 2019), and should be treated with caution. However, a thoughtful approach that allows for credible interpretations of the most reliable data, with a focus on pupils' knowledge

and understanding at the heart of it, can help teacher educators with their decision-making. External evidence has its weaknesses too (Hirsch, 2002). However, the more robust findings can guide teacher educators away from “some things that are popular or widely thought to be effective [which] seem, on the basis of this evidence, to be probably not worth doing” (Coe, 2013, p.ix). The decisions teacher educators make about what to implement come with an opportunity cost: the more time that is devoted to less effective strategies, the less time there is to spend on more effective ones. Therefore, we need to try to select the right solution. And, as Collins provocatively puts it, “[i]f you’re not using evidence to inform your decisions, you must be using prejudice” (Collins, 2017 in Rose & Eriksson-Lee, 2017, p.5).

How then should Leona approach using external evidence to help her select a solution?

- **Start big:** where possible, draw on research with large samples. Teacher educators are not so interested in how an intervention worked for the teachers or pupils within a study; instead, they are interested in whether or not that same intervention might be beneficial for their teachers and pupils. Bigger samples tend to allow for more generalisable conclusions.
- **Be sceptical:** just because a study had a large sample, it does not mean it is of high quality. How were pupils/teachers/schools selected? How many of them dropped out of the study? If leaders are going to use a study to support their decision-making, they will need to interrogate it, especially if they like the conclusions of the study because “our preferences do not determine what is true” (Sagan, 1995, p.27).
- **Avoid myths:** myths, misconceptions and disproven but enduring ‘zombie’ ideas exist within education (de Bruyckere et al., 2015). Teacher educators cannot know them all, but if they are aware of some of the most prevalent or pernicious ones, it will save them a lot of time and help them to zone in on what might be most promising.

Leona already has an understanding of some of the core ideas from cognitive science about memory, including the limitations of working memory and the concepts of retrieval and storage strength. She knows that “learning happens when people have to think hard” (Coe, 2013, p.xiii) and that careful use of ‘desirable difficulties’ such as interleaving and spacing can help ensure that this happens. Leona remembers reading that ‘practice testing’ was the most effective strategy for learning and comprehension in ‘Strengthening the Student Toolbox’ (Dunlosky, 2013); she decides to go back to this and dig a little deeper by reading the original review of the research behind this (Dunlosky et al., 2013). This gives Leona more confidence that low stakes testing is likely to be an effective way of boosting pupils’ retention by retrieving previously learned knowledge. The review draws from a large number of high-quality studies using retrieval in a variety of situations, including testing in the form of verbal questioning, which links to what she has seen in EYFS and key stage 1. Dunlosky et al. (2013) and Agarwal et al. (2020) also highlight that providing pupils with feedback on low-stakes tests and spacing the tests out over time are important in enhancing their effectiveness.

Leona knows that her school’s key stage 1 lead, Roy, has a wealth of knowledge around effective teaching and the research behind it. Leona decides to discuss her ideas around introducing low-stakes testing with Roy, with a particular focus on what this looks like in practice. Roy recommends that she read further into the use of retrieval, including looking at some more recent research. A good starting point for this is Professor Rob Coe’s recommendations (2020) that teachers carefully consider whether pupils have learnt the content initially as well as the type and difficulty of questions being asked.

Leona has read a fair bit of research over the course of her career, so she has a reasonable idea of what questions to ask Roy and where she might find further evidence. But what resources exist for teacher educators looking to use evidence to support their decision-making?

Pause. Reflect. Respond.

1. Which of these three approaches – start big, be sceptical, and avoid myths – do you currently already do?

2. For any of the above that you do not currently do, can you think of an example of when you might do this in the future?

Selecting the right solution: an area in focus: sources and guidance

There are a number of notable challenges that make accessing, analysing and interpreting evidence difficult for those who work in schools. In the case of research, for example, a lack of time to read and digest findings (EEF, 2018b); having to interpret needless complexity or scientific jargon baked into some papers (MacLellan, 2016; Hendrick & MacPherson, 2017); not to mention the fact that research is “dynamic, not static”, meaning that teacher educators often need to make updates to their understanding (Willingham, 2012a, p.86). As Willingham (2012a) summarises: “Evaluating research is like buying a car. There’s an optimal solution to the problem, which is to read and digest all of the relevant research, but most of us don’t have the time to execute the optimal solution” (p.23). Over time, teacher educators should look to develop the knowledge they need in order to interpret and use evidence. For teacher educators who are keen to make a start, these sources and guidance may prove helpful: A teacher educator who is looking to select the right solution might start by looking at what certain organisations who commission and conduct research have previously found to be more or less effective. For example:

- [The Education Endowment Foundation](#)
- [The Institute for Education Sciences](#)
- [The Campbell Collaboration](#)

A teacher educator who is new to appraising evidence, both internal and external, might start by looking at guides that supply useful questions to ask of data and research. For example:

- Riley, E. (2019). [Data science: a guide for society](#). Sense about Science.
- Assessing Claims in Education. (n.d.). [Key concepts for thinking critically about educational claims](#).
- Haslam, J. & Shaw, A. (2019). [Engaging with evidence guide](#). Institute for Effective Education.

After some weeks, Leona and Roy agree that using low-stakes testing (or ‘quizzing’) appears promising. It seems that the optimal frequency of quizzing is difficult to determine, so Leona decides that a roughly weekly approach (depending on subject timetabling) appears an appropriate balance between time and impact. The final question Leona now needs to ask is “is this particular solution the right one for my school?”.

Focusing on fit

“Everything works somewhere and nothing works everywhere” (Wiliam, 2018, p.2)

Effective implementation requires teacher educators to ensure that the solution they select is right for their context. They will need to assess the fit of potential strategies even if they are supported by robust evidence because “[r]esearch can only tell us what has worked in the past, not what will work in the future” (Major & Higgins, 2019, p.ix). A teacher educator needs to consider what current barriers and parameters exist which could prevent the successful execution of a strategy in their school, college or trust, or what conditions they might need to establish first in order to enable any new strategy to have the best chance of success: for example, a teacher educator might want to focus on improving whole school behaviour before introducing a large strategic change to the assessment policy. They also need to consider how large a commitment the new strategy is likely to be and weigh up whether it is worth investing in, or if time and cost would be better spent elsewhere. Where possible, examining current approaches to see how they might be adapted, rather than starting from scratch, and considering how existing processes and resources might be repurposed, rather than creating a separate set of procedures, can potentially lessen costs and increase the ease and attractiveness of adoption. However, committing to a strategic change is still likely to be a significant undertaking. This means that before teacher educators begin preparing for implementation they ought to consider, amongst other things (see Proctor et al., 2011):

- **Feasibility:** how possible, given existing constraints, it will be to properly deliver the strategy. Even if a strategy appears promising, teacher educators still need to decide whether or not it can be delivered in their setting. As Wiliam (2018) reiterates, many strategies, even those that are supported by robust research, will “work in some contexts but not others” (p.2). Teacher educators may wish to ask themselves and/or those advocating for change: are we in a position to introduce this change? What barriers would we need to remove to put ourselves in a better position? And, is there anything which we currently do that we could repurpose to make delivery more feasible (such as using an existing online system which colleagues are familiar with, rather than investing in a new one).
- **Cost:** how costly and cost-effective the strategy will be to deliver. Even if a strategy appears promising, teacher educators still need to decide whether or not it is worth the financial investment. As Slavin (2019) put it: “Cost-effectiveness might not entirely determine which choice is made, but, one might argue, it should always be a key part of the decision-making process”. Teacher educators may wish to ask themselves and/or those advocating for change: how expensive will it be to introduce this change? Are there any hidden or future costs (such as re-licensing with an online tool every two years)? And, could we achieve more for less (perhaps by selecting a more cost-effective strategy instead, or investing more into what the school, college or trust is already doing)?
- **Sustainability:** to what extent it could be maintained (in terms of feasibility and cost) in the long term. Even if a strategy is effective in the short term, teacher educators still need to decide whether or not it can be maintained in the long term. In some cases, a leader might even have plans to scale up a strategy – from one class to a whole department, from one year-group to a whole school, or from one school to across a whole trust. As well as asking questions about the feasibility and cost of sustaining and scaling-up, teacher educators need to consider properties of the strategy itself, namely generalisability and persistence (Green, 2020): how likely is it that this strategy would work as well, or at all, in that department or in that school? And, will it lead to lasting change, or will the effects fade out over time?

Working with teachers to support them to implement low-stakes retrieval quizzing appears to be low-cost and should be sustainable as quizzes can be reused. Leona is fully aware that quizzing will not solve the problem of pupils forgetting what they have learnt. This is a complex problem which like other challenges in school cannot be fully solved due to its complex nature. However, low-stakes quizzing seems likely to improve pupils’ retention.

Leona realises that rolling low-stakes quizzing out with every teacher and for every class at once is unlikely to be feasible. Leona will need to think about how she might make this more manageable, perhaps by piloting the approach with some teachers, departments, or classes first. Leona also needs to consider how to ensure that sufficient expertise exists within the school to support feasibility – she can support teachers to write effective quizzes for her subject and key stage, but to support all staff she is going to need to draw upon the expertise of others.

Pause. Reflect. Respond.

1. Which of these areas – picking the right problem, selecting the right solution, or focusing on fit – would you like to learn more about?

2. What action could you take to learn more about this area?

Summary

Overall, Leona has three key takeaways:

- Pick the right problem by testing a hypothesis, triangulating, and focusing on trends.

- Select the right solution by starting big, being sceptical and avoiding myths.
- Assess the solution's fit by considering feasibility, cost, and sustainability.

Caveat

Implementing a strategy is hard and should not be taken up lightly. One rule of thumb teacher educators ought to try and stick to is to be prudent: make as few changes as possible whilst maintaining an effective and improving school. Teacher educators will be better served by prioritising and pursuing fewer strategic changes diligently than they will be trying to introduce numerous sweeping changes simultaneously. Additionally, teacher educators should always consider whether the best solution to a problem might involve subtracting an existing strategy, rather than adding a new one. One study has suggested that when problem-solving is left unprompted, people tend to default to introducing something new even when the same outcome could be achieved by taking something away (Adams et al., 2021). Whilst this heuristic might be helpful in many contexts, it is worth bearing in mind that “[m]ore is not always better in teaching” (Major & Higgins, p.xvii). A final consideration – alongside doing less – is to do nothing. In many circumstances, the right decision for a teacher educator might be to not introduce a new strategy. Many school improvement initiatives do not work (Coe, 2013), and even where trials have involved delivering a strategy with a robust evidence-base – such as instructional coaching – they can still prove ineffective, or worse (see the example of Achievement for All in Humphrey et al., 2020). Teacher educators should ask themselves these, or similar, questions before committing to preparing for implementation (adapted from Willingham, 2012b):

- “Is there a reason to think that things may get better if we were to take no action?”
- “Do we have some reason to believe that the new strategy will not make things worse?”
- “Is it possible that the strategy will make some things better but make others worse?”

Pause. Reflect. Respond.

What are your main takeaways from this evidence summary?

Further reading

If you are interested in finding out more about what types of evidence you can use, the strengths and limitations of that evidence, and what questions to ask of it, have a read of...

[Haslam, J. & Shaw, A. \(2019\). Engaging with evidence guide.](#) Institute for Effective Education.

- This is a short guide, produced for teachers and leaders, on how to engage with different forms of evidence.

[Assessing Claims in Education. \(n.d.\). Key concepts for thinking critically about educational claims.](#)

- This is a website page, produced for teachers and leaders, on ‘how to think critically about educational claims’.

If you are interested in finding out more about how to pick the right problem, select the right solution, and focus on the fit of a strategy, have a read of...

[Education Endowment Foundation \(2019\). Putting Evidence to Work: A School’s Guide to Implementation: Guidance Report.](#)

- This is a practice guide, produced for teachers and leaders, on how to implement changes within a school or educational setting.

References

Adams, G., Converse, B., Hales, A. & Klotz, L. (2021). People systematically overlook subtractive changes. *Nature*, 592, 258–261.
<https://doi.org/10.1038/s41586-021-03380-y>

Agarwal, P. K., Roediger, H. L., McDaniel, M. A., & McDermott, K. B. (2020). How to use retrieval practice to improve learning. Saint Louis, MO: Washington University in St. Louis. <http://pdf.retrievalpractice.org/RetrievalPracticeGuide.pdf>

Assessing Claims in Education. (n.d.). Key concepts for thinking critically about educational claims. <https://thatsaclaim.org/educational/>

Coe, R. (2013). Improving Education: A triumph of hope over experience. Centre for Evaluation and Monitoring.

<https://img1.wsimg.com/blobby/go/ede177f2-5088-4fee-a850-d64ccdf72d47/downloads/Improving%20Education%20Coe%20Inaugural%20June%202013.pdf?ver=1621348419849>

Coe, R. (2020). Does research on retrieval practice translate into classroom practice?. *Impact*, (8), 12-13.

https://my.chartered.college/impact_article/does-research-on-retrieval-practice-translate-into-classroom-practice/#:~:text=Does%20research%20on%20retrieval%20practice%20translate%20into%20classroom%20practice%3F,-Perspective%20Article&text=Retrieval%20practice%20is%20strongly%20supported,used%20in%20classrooms%20across%20England.

Coe, R. & Kime, S. (2019). A (new) manifesto for evidence-based education: twenty years on. *Evidence Based Education*.
<https://evidencebased.education/new-manifesto-evidence-based-education/>

de Bruyckere, P., Kirschner, P. & Hulshof, C. (2015). *Urban Myths and Learning and Education*. Elsevier.

Dunlosky, J. (2013). Strengthening the student toolbox: Study strategies to boost learning. *American Educator*, 37(3), 12-21.
<https://files.eric.ed.gov/fulltext/EJ1021069.pdf>

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14(1), 4-58.
<https://bibliotecadigital.mineduc.cl/bitstream/handle/20.500.12365/17388/dunloskyimprovinglearning.pdf?sequence=1>

Education Endowment Foundation (2018a). Making best use of teaching assistants.

<https://educationendowmentfoundation.org.uk/tools/guidance-reports/making-best-use-of-teaching-assistants/>

Education Endowment Foundation. (2018b). The Ashford Teaching School Alliance Research Champion project.
<https://educationendowmentfoundation.org.uk/projects-and-evaluation/projects/research-champions/>

Education Endowment Foundation (2019). Putting Evidence to Work: A School's Guide to Implementation: Guidance Report.
https://d2tic4wvo1iusb.cloudfront.net/eef-guidance-reports/implementation/EEF_Implementation_Guidance_Report_2019.pdf?v=1635355218

Epstein, M., Atkins, M., Cullinan, D., Kutash, K. & Weaver, R. (2008). Reducing Behavior Problems in the Elementary School Classroom: A Practice Guide (NCEE #2008-012). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/behavior_pg_092308.pdf

Green, C. (2020). Interventions to Do Real-World Good: Generalization and Persistence. *Psychological Science in the Public Interest*, 21(2) 43-49. <https://doi.org/10.1177/1529100620933847>

Guskey, T. R. (2016). Gauge impact with 5 levels of data. SMEC2016 Organising Committee, 6.

Haslam, J. & Shaw, A. (2019). Engaging with evidence guide. Institute for Effective Education.
<https://groundupeducation.files.wordpress.com/2021/10/engaging-with-evidence.pdf>

Hendrick, C. & MacPherson, R. (Eds.). (2017). *What Does This Look Like in the Classroom? Bridging the gap between research and practice*. John Catt Education Ltd.

Hirsch Jr., E. (2002, October 01). Classroom Research and Cargo Cults. Policy Review, Hoover Institution.
<https://www.hoover.org/research/classroom-research-and-cargo-cults>

MacLellan, P. (2016, August 9). Why don't teachers use education research in teaching? education in chemistry, Royal Society of Chemistry.
<https://edu.rsc.org/analysis/why-dont-teachers-use-education-research-in-teaching/2010170.article>

Major, L. & Higgins, S. (2019). *What works?: Research and evidence for successful teaching*. Bloomsbury Education.

Proctor, E., Silmire, H., Raghavan, R., Hovmand, P., Aarons, G., Bunger, A., Griffey, R. & Hensley, M. (2011). Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda. *Administration and Policy in Mental Health and Mental Health Services Research*, 38(2) p65–76. <https://link.springer.com/content/pdf/10.1007/s10488-010-0319-7.pdf>

Riley, E. (2019). Data science: a guide for society. Sense about Science. <https://wordpress-398250-1278369.cloudwaysapps.com/wp-content/uploads/2019/06/SaS-DataScienceGuide-V8-SinglePages.pdf>

Rose, N. & Eriksson-Lee, S. (2017). Putting Evidence to Work. Teach First. https://www.teachfirst.org.uk/sites/default/files/2017-10/Putting_Evidence_to_work_2017.pdf

Sagan, C. (1995). Wonder and Skepticism. *Skeptical Inquirer*, 19(1), 24-30. <https://skepticalinquirer.org/1995/01/wonder-and-skepticism/>

Scutt, C. & Harrison, S. (2019). Teacher CPD: International trends, opportunities and challenges. Chartered College of Teaching.
<https://my.chartered.college/wp-content/uploads/2019/11/Chartered-College-International-Teacher-CPD-report.pdf>

Slavin, R. (2019, August 22). Cost-Effectiveness of Small Solutions. Robert Slavin's Blog.
<https://robertslavinsblog.wordpress.com/2019/08/22/cost-effectiveness-of-small-solutions/>

Wiliam, D. (2018). Creating the schools our children need: why what we're doing now won't help much (and what we can do instead). Learning Sciences.

Willingham, D. (2005). Ask the Cognitive Scientist: How Praise Can Motivate—or Stifle. *American Educator*, Winter.
<https://www.aft.org/ae/winter2005-2006/willingham>

Willingham, D. (2012a). When can you trust the experts? How to tell good science from bad in education. Jossey-Bass.

Willingham, D. (2012b). Measured Approach or Magic Elixir: How to Tell Good Science from Bad. *American Educator*, Fall.
https://www.aft.org/sites/default/files/periodicals/Willingham_2.pdf

This content has been written and developed by:



This content has been funded by:

