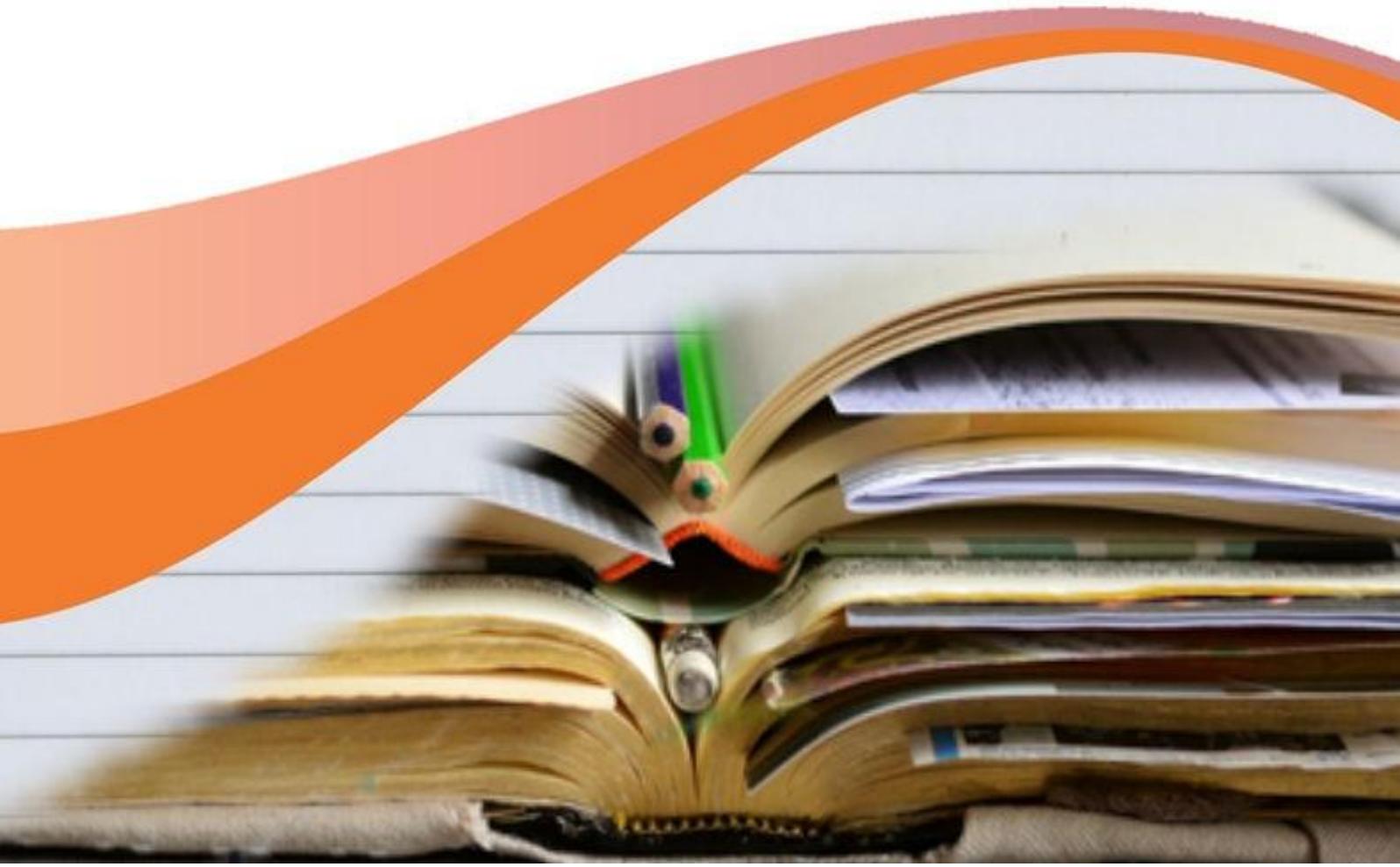


Engaging with evidence guide

March 2019

Institute for Effective Education



This guide is produced by the Institute for Effective Education (IEE).

Written by: Jonathan Haslam and Dr Alicia Shaw

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Introduction

Welcome to our guide to 'Engaging with evidence'

Teachers and schools are being encouraged to become more evidence-based or evidence-informed, the aim being to use evidence to improve teaching practice. By acting on the best evidence, it increases the likelihood that we will make better decisions.

But how do we identify the best evidence? Whether it is a blog or a research article, with so much information out there, how can you find the evidence that is useful and reliable?

In this guide we will give you some initial pointers. Our aim is that, when looking for the answer to a particular question, you will be able to look for evidence that is appropriate for that question, and begin to weigh its value.

In the next few pages, you will:

- understand about different forms of evidence and different kinds of research
- understand which types of research/evidence are best placed to answer different sorts of questions
- be aware of the limitations of different forms of evidence
- have some key questions you can ask to test the relevance and usefulness of evidence sources.

Finally, we have included some links to popular sources and resources that can help you engage with evidence and begin to make the best decisions for the pupils in your school.

Types of evidence

“Evidence” is a broad term, and can include everything from in-school data or a conversation with a colleague in a corridor to a meta-analysis including data from thousands of pupils. In this guide, we are considering evidence as being a published article from outside the school. That is still a pretty broad definition, and includes, as we will see, blogs, tweets and newspaper articles. But it is important to include this kind of evidence, because it is often easier to find and easier to understand.

It is also not possible to say that one kind of evidence is always definitely better than another - you can have a great blog and a terrible randomised control trial, and vice versa. Sometimes you will see hierarchies of evidence. We haven't included that in this guide, because we know that, at every level of evidence, there are good quality examples to be found.

So what are the different kinds of evidence?



Blogs and social media

The introduction of blogging and social media has revolutionised the way that we communicate with each other. Anyone can write up a classroom experience or respond to an existing piece of research and this can then be seen and read by anyone in the world. When written by practitioners, articles such as these are hugely important in supporting other practitioners to implement the findings from research and incorporate them into their practice. Blogging and social media have also provided researchers with a way to engage with practitioners directly and make their findings available to a wider audience.

Newspapers and magazines

The traditional education and mainstream press is a useful source of evidence, including as it does news and articles written by journalists, researchers, practitioners, and experts from across the education sector. There is information about recent research and policy, and opinion pieces that try to put these developments in context for practitioners. The challenge can be in finding the actual evidence that supports the opinion or the headline. It can be difficult to get to the research behind the story.



Research evidence

The following kinds of evidence can be loosely grouped together as research. Research can be published in academic journals, but also by independent organisations (think-tanks, charities, government departments) or even individuals or small groups. Publication in an academic journal is not of itself a guarantee of quality.



Theory

An author might propose a particular theory as to how or why something works. Clearly, some of the most important leaps forward in human knowledge have been made when someone comes up with a new theory of how the world works (gravity, evolution, relativity, etc). These theories are vital in our conceptual understanding of how things work, but they need testing and supportive evidence.

Case study



The experience of one researcher, teacher, class, school, etc. These narratives are hugely important in providing us with information on the experience of someone like us. They are a useful guide to what we might experience ourselves in a similar situation and it is helpful if someone has done some of our thinking for us. The problem, though, is whether their situation is the same as ours. Will our experience be the same?

Surveys: questionnaires and interviews



Research that has canvassed the opinions of a group of people – whether they be pupils, parents or teachers. Clearly this tells us something about the opinions of the group – whether they liked a teaching approach, whether they're thinking of leaving the profession – but it doesn't necessarily tell us what actually happened – did outcomes improve, did they actually leave the profession?

Data analysis



Research that relies on existing data, and analyses it to draw particular conclusions. Do children who are born in the summer get lower grades at Key Stage2? Do academies have better pass rates at GCSE? Such studies can suggest possible links between the two, but they can't tell us that one circumstance definitely led to a particular outcome. In the language of research they can show that there is a correlation between the two, but not causation.

Experiments



In simple terms, an experiment involves changing something (such as an aspect of teaching) and finding out what difference it made. This is possible with just one class (even with one pupil) and we can learn something about that individual case. The strength of experiments, though, is their potential to provide information that can be generalised to different contexts. The larger and more robust the experiment, the more likely this is to be the case.

So far, we have been talking about individual research studies, but as more studies are published, it clearly makes sense to combine these into an overall picture – **a review** – of the evidence to date. For practitioners these can be a very useful summary of the current “state of play” on a particular topic. There are many different kinds of review, but for simplicity we will divide them into three:

Systematic review



A systematic review has clear criteria for the way that research is collected (so that nothing is missed) and then sorted (so that only high quality research is included). The reviewers will then write up the conclusions of the qualifying studies. Done correctly, systematic reviews are high quality. Systematic reviews are time-consuming, and ruthless with poor quality evidence. In education, that means that the number of systematic reviews that provide useful evidence is limited.

Meta-analysis



A meta-analysis takes studies that have quantitative outcomes (ie, numerical data) and combines them to give an overall result from many different studies. This provides a measure of impact based on thousands, even tens of thousands, of pupils. A major challenge for meta-analyses can be ensuring that they have robust search strategies and quality control measures for the research they include.

Other reviews



There are many other ways of collecting, and drawing conclusions, from multiple studies. A researcher who has spent a lifetime working on a particular topic will no doubt have read and considered hundreds of papers. They might write a review highlighting the best of this research and its implications – something that would be incredibly useful and informative, and save a lot of time for busy practitioners. However, regardless of an author’s credentials and experience, it is important to have a robust search strategy and quality control on the studies included.

Bias

Before we look at each type of evidence in more detail, a word about **bias**. Both authors and readers are at risk of bias. As we consider each evidence type we will discuss ways that the research might be biased. But we each bring our own biases when we read a piece of evidence. Ask yourself whether you are giving a piece of evidence a fair hearing or are using your existing knowledge and opinions to unfairly judge it. There are many cognitive biases that we all can have, but here are some of the most common:

Confirmation bias. We tend to believe evidence that confirms our existing point of view (and dismiss out-of-hand evidence that contradicts it).

Anchoring bias. We tend to believe the first bit of evidence we read, and then consider any subsequent evidence as secondary to this.

Bandwagon effect. We tend to believe and do things because a lot of other people (particularly colleagues or friends) do. But just because something is fashionable does not mean it is a good idea or an effective approach.

Status quo bias. We like things to stay the same, so tend to dismiss things that contradict our current ways of working or thinking.

Pro-innovation bias. We like shiny new things. In education, enthusiasm for new technology might fall into this category, but also consider the way that teachers can be magpies, pinching ideas from others (even though the idea may not necessarily be effective).

Hero bias. We tend to believe the opinions of successful individuals (eg, teachers and head teachers). However, it is difficult to replicate their success, even if we can be certain that we or they have accurately described the strategies they believe made them successful.

What kind of evidence is likely to answer your question?

In this section, we will discuss each type of evidence in more detail, and indicate how it might be useful and the kind of questions you might ask.

The table below gives a suggestion of the kind of evidence you might look at for particular kinds of questions. Whether it can answer your question depends on whether the evidence exists, and whether it is good quality.

| | Is this approach effective? | How does it work? | Does it make an educationally important difference? | Will it be successful in our context? | Will it be received positively by pupils and staff? | Is it cost-effective? |
|--------------------------|-----------------------------|-------------------|---|---------------------------------------|---|-----------------------|
| Blogs and social media | ✓ | ✓ | | ✓ | ✓ | |
| Newspapers and magazines | ✓ | ✓ | | ✓ | ✓ | |
| Theory | | ✓✓ | | | ✓ | |
| Case studies | ✓ | ✓ | ✓ | ✓ | ✓✓ | |
| Surveys | ✓ | ✓ | | ✓ | ✓✓✓ | |
| Data analysis | ✓ | ✓ | ✓ | | | |
| Experiments | ✓✓ | ✓ | ✓✓ | ✓✓ | | ✓✓ |
| Systematic review | ✓✓✓ | ✓✓ | ✓✓✓ | ✓✓✓ | ✓✓ | ✓✓✓ |
| Meta-analysis | ✓✓✓ | ✓✓ | ✓✓✓ | ✓✓ | ✓ | ✓✓ |
| Other reviews | ✓✓ | ✓ | ✓ | ✓ | ✓ | |



1. Blogs and social media

There are more than 3,000 education blogs in the UK. Over the last few years, teachers, researchers, and others in the education sector have taken to social media and self-publishing platforms. It offers the opportunity to share reflections, and discuss your own or others' experiences and research.

On social media, there are thriving communities discussing research and their own approaches.

The quality of this evidence is very variable, and it is always best to remember that they are just one person's opinion, no matter how well-informed. They are rich with information about that experience, but may not generalise to other situations.

Useful for:

- Experiences of individual teachers and schools.
- A teacher's interpretation of what a piece of research means and how it might be used in practice.
- Accessibility – blogs by teachers are, generally, written in the style of language that teachers know and understand.
- Researchers explaining their research in more accessible terms and, on social media, happy to discuss the implications of their findings.

Questions to ask:

- Who is the author?
- What is their experience and context?
- What is their expertise? Are they qualified to comment on this issue?
- Does the author have a vested interest in the area?
- What is the (research) evidence on which their article is based? If a blogger concludes that something worked in their classroom, what evidence is this based on?
- Have they included links to the research or further reading?
- Are their conclusions justified by the (research) evidence they have referred to?



2. Newspapers and magazines

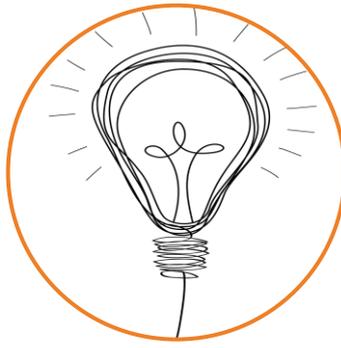
News outlets are, by definition, interested in the new, so you rarely see the headline “New research confirms what we already knew”. There can be more of an interest in conflict and controversy. That said, journalists do their best to write stories that are accurate. They are reliant on their sources, of course, and on occasion these sources might be interested in sensationalising or even misrepresenting results in order to achieve publicity. One longstanding issue with newspaper and magazine articles is that they do not tend to link to the original research. They are keen to preserve their sources and make sure that you read their magazine.

Useful for:

- Experiences of individual teachers and schools.
- Hearing directly from the researcher in clearly understandable terms.
- Accessibility – articles are clearly written, often in the style of language that teachers know and understand.
- A first look at new findings.

Questions to ask:

- Who is the author?
- What is their experience and context?
- What is their expertise? Are they qualified to comment on this issue?
- Do any people they quote have a vested interest in the approach?
- What is the (research) evidence on which their article is based, if it is possible find?
- Are their conclusions justified by the (research) evidence they have referred to?



3. Theory

As well as wanting to know how, why and whether particular approaches work, it is also useful to have an underlying theory into which the approaches fit. This might be the theory of how children learn language or mathematics or wider ideas of psychology. In this context, we are using theory in the scientific sense – an explanation of something that accounts for the available facts and can be tested further. Such theories are useful because it helps to have a conceptual framework to work with, and supports the development of new approaches to particular problems.

Useful for:

- Generating ideas for possible solutions.
- Understanding where a particular problem sits within the wider field.

Questions to ask:

- Who is the author?
- What is their expertise and experience?
- Are they qualified to comment on this issue?
- How does their theory fit the available evidence?



4. Case studies

Studies that look at one, or a small number of, children, classes or schools. Case studies can be observational, describing the situation that exists, or they can describe what happened when something changed. More robust case studies will follow a precise methodology (such as action research) in order to structure the project. Having a clear research question, considering previous research and collecting and analysing data are all important. Case studies are indicative – suggesting solutions that are acceptable and feasible – but they are not robust enough to tell you whether the solutions are effective.

Useful for:

- Generating ideas for possible solutions.
- Considering how these solutions might be implemented, and whether they were popular with staff and pupils.

Questions to ask:

- Is the context similar to mine?
- Is the approach clearly described?
- To what extent is existing evidence considered? How is this research chosen?
- Are the limitations of the study made clear?



5. Surveys: questionnaires and interviews

Gathering the views of a particular population can provide useful information on the values and opinions of that population. It can help to decide whether or not a particular approach is going to be acceptable. So “did you enjoy the intervention?” would provide helpful information. However, surveys can provide little evidence on the outcomes of the intervention. The question “how much did you learn with this intervention?” is really “how much do you think you learnt during this intervention?”. Participants may not have an accurate view of what they have learned. Another potential problem with questionnaires and interviews is the use of leading or loaded questions (eg, “How worried are you about staff recruitment?”) that skew the answers of participants.

Useful for:

- Information about the attitudes and opinions of large populations.
- Identifies whether particular challenges are widespread.
- Suggests approaches that might prove to be acceptable.

Questions to ask:

- How was the survey population chosen? Is it a relevant population?
- If it was a section of the population, how was this chosen? At random or using some other method? Is the sample a fair representation of the population?
- Has the questionnaire been checked (for example, in a previous academic study) to prove that it is valid and reliable?
- Were any of the questions leading or loaded?
- Do the conclusions of the report accurately reflect the data or do the authors speculate beyond it?



6. Data analysis

Studies that analyse existing data about a particular population. For example, cohort studies look at the progress of a particular group over a period of time (eg. the Millennium Cohort Study is following the progress of nearly 20,000 children born in the year 2000). By presenting the cohort with multiple questionnaires and interviews, and collecting data from other sources, researchers can analyse the links between different attributes. For example, boys who are close to their mother might be less likely to experience mental health problems. Importantly, this kind of information only points to an association between the two attributes. It might suggest that one leads to another, but the relationship could work the other way or a separate factor might influence both attributes. Further, it does not give information on whether an intervention (eg. to encourage mothers to have closer relationships with their sons) would lead to improved mental health for their sons.

Useful for:

- Profiles of populations over time.
- Suggesting links and connections between different attributes.
- Suggesting approaches or interventions that could be tested to see if they make an important difference.

Questions to ask:

- How was the population selected (eg, by random selection)? If it is a sample, does it reflect the wider population?
- When profiling links between the data, are other explanations considered (eg, socio-economic, genetic)?
- Do the authors draw causal links where these are not justified?



7. Experiments

At its simplest, in an experiment a change is made and then there is an observation of the impact of that change. There are a number of factors that increase the reliability of experiments. Having two groups – an intervention group that receives the new approach, and a comparison group that does not. Both groups being measured, using independent tests not invented by the researcher, at the beginning and end of the experiment (pre- and post-tests). Randomised controlled trials (RCTs) where participants are allocated randomly to the intervention or comparison (in RCTs generally called control) groups, are usually better quality experiments. Larger sample sizes – the more individuals involved in the experiment the better. Experiments that reflect real-world conditions with representative populations provide more useful information. So, for example, if an intervention involves a lot of input from researchers and trainers, will that be achievable as a scaled-up activity?

Useful for:

- Finding out whether a particular intervention is effective.

Questions to ask:

- How large was the sample size?
- Was there a comparison group, and were participants selected at random to be in each group? Were the intervention and comparison group similar before the intervention started?
- What did the comparison group do – was their “business as usual” a fair comparison?
- Were the two groups measured at the beginning and the end of the project (pre- and post-test) using an objective measure?
- Were they measured using an independent test (ie, not developed by the researchers) which tested content that both the intervention and comparison group had studied?
- What steps were taken to reduce bias? For example, could the person administering or marking the test know which groups the pupils were in?
- Has the author outlined limitations of the experiment?



8. Systematic review

Systematic reviews combine a clear, replicable search protocol with a systematic appraisal of the research studies identified, followed by a systematic analysis of the identified papers. A properly conducted systematic review will therefore provide information from the highest-quality studies on the topic. Unfortunately, there are very few systematic reviews in education (35 in the Campbell database compared with nearly 8,000 in medicine's Cochrane database) so the chances of having your question answered by a systematic review are currently slim. Systematic reviews can be affected by publication bias (when research which reports positive outcomes is more likely to be published in academic journals than research with negative outcomes). If the authors do not find all of the available evidence, but only use the evidence which has been published, an important part of the story may be missing.

Useful for:

- A high-quality review of the current evidence on a particular topic.

Questions to ask:

- Does the research question match my own?
- Was a robust systematic review approach taken?



9. Meta-analysis

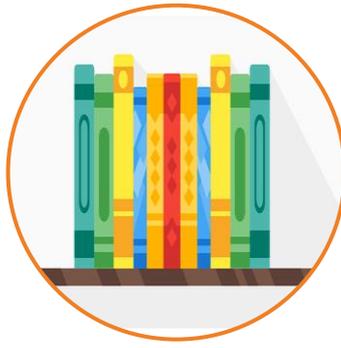
A meta-analysis takes the (numerical) results from many experiments and combines them into one overall measure of impact. High-quality meta-analyses have clear and thorough search strategies and quality-control the studies included, such that the studies being combined are robust and comparable. It is useful if a meta-analysis also includes a narrative section, discussing the strengths and weaknesses of the studies that have been included, details of how an approach was received, how easy it was to implement, and so on. Like systematic reviews, meta-analyses can be affected by publication bias, which could lead to an overestimation of the likely impact of an approach.

Useful for:

- An indication of whether a particular approach has a positive impact on specific outcomes, and whether this impact is educationally important.

Questions to ask:

- Is the research question clear?
- What was the search strategy, and what measures have been taken to ensure the quality of the experiments included?
- Are the experiments included in the meta-analysis comparable? For example, did they evaluate the impact of comparable interventions on comparable outcomes?
- Is there information on where the experiments have been carried out, in what kinds of populations?



10. Other reviews

There are many other kinds of reviews published in education – critical reviews, thematic reviews, literature reviews, narrative reviews and more. All aim to combine the findings from a range of research on a topic into a summary that encapsulates the results of that research. It might include a quantitative element, providing an overview of the impact one might expect to see, or it might simply provide a narrative around the approach or intervention.

Useful for:

- An overview of the evidence on a particular topic.

Questions to ask:

- Was a rigorous approach taken, when searching for published (and unpublished) research to include?
- How was the research filtered and appraised?
- Does the review fit with your understanding of evidence in this area? Are you aware of any contradictory evidence which has not been included?
- Is the author qualified to comment on this issue? Do they have known vested interests in the area?

Choosing an intervention or approach

When making decisions about implementing a new approach or buying a new programme, some types of evidence are more helpful than others.

| Type of evidence | What questions might this type of evidence answer? | Should I use this type of evidence to decide which strategies to implement in my school? |
|---|--|--|
|  Blogs & social media | Is this topic important to other people? What do others think about an approach? | <p>Not on their own. It can be a good, accessible starting point, but unlikely to give a strong indication that an approach is likely to work in your setting.</p> |
|  Newspapers & magazines | Is this topic important to other people? What do others think about an approach? | <p>No. Unlikely to provide enough detail or certainty to justify implementation, but may provide an accessible introduction.</p> |
|  Theory | How does this topic fit into broader theories of teaching and learning? | <p>No. It puts the topic into context and suggests approaches to investigate.</p> |
|  Case study | How has this issue been approached by others? What have others done to successfully implement an approach? What barriers to implementation did they face? | <p>No. However case studies may provide useful information about the conditions under which an approach has worked in the past, which can support successful implementation.</p> |
|  Surveys | What do those involved think about the approach? What will help me to implement the approach successfully, and what barriers to implementation might I face? | <p>No. Information from surveys does not give a reliable indication of whether a practice is likely to be effective, but it can provide useful information about how to implement the approach.</p> |
|  Data analysis | What is the relationship between two variables? | <p>No. Analyses of data sets tell you how two variables change together, but cannot tell you why the variables behave as they do.</p> |
|  Experiments | Is approach X likely to work better than approach Y? | <p>Yes. Particularly if it is a robust experiment. RCTs are a good source of evidence when deciding which intervention to use.</p> |
|  Systematic review | What does research tell us about a particular area of teaching? | <p>Yes. Systematic reviews will help you to understand the research in the area and help you to make an evidence-informed decision.</p> |
|  Meta-analysis | What impact is a particular teaching practice likely to have on the learning of pupils? | <p>Yes. If they are good quality, meta-analyses give a good indication of the potential impact of an approach or practice.</p> |
|  Other reviews | What does research tell us about a particular area of teaching? | <p>Possibly. It can provide a good introduction, depending on the quality of the review.</p> |

Reading evidence – ‘red flags’

Making school improvement decisions based on evidence can result in us choosing the best bets for our pupils. However, it’s important to engage with credible evidence. Keep an eye out for these ‘red flags’ which might make you sceptical about the trustworthiness of evidence you are reading.



Red flags: Author and publication

What would make you sceptical in relation to the author or where the article was published?

- The author has biases or vested interests.
- The author is not qualified to comment or has no experience in this field.
- The article is shared on a commercial website that benefits from the intervention or approach.
- Research that is funded by an individual or organisation with vested interests.



Red flags: Literature or evidence reviews

What would make you sceptical in relation to reviews of previous research?

- Reporting only studies which support the author’s views, or are written by the author, and ignoring any other evidence.
- Uncritical inclusion of poor quality studies.
- Applying findings to situations or people beyond the original research.
- Conclusions which most experts in the field would disagree with.



Red flags: Experimental research methods

What would make you sceptical in relation to research methods?

- Small or biased samples.
- The intervention and comparison group not being similar before the research began.
- Measures testing things that only the intervention group has learnt.
- Measures created by the researcher.
- High rates of participants dropping out, which is not taken into account in the conclusions.
- Using a research method which is not appropriate to answer the research question.



Red flags: Data analysis and conclusions

What should you watch out for when people present data and their conclusions?

- Not reporting outcomes for all planned measures, especially if the outcomes reported support the author’s initial opinion.
- Conclusions being drawn which are not supported by results.
- Applying findings to situations or people beyond the scope of the research.
- Over-complicated (or even made-up) scientific language.
- Not reporting limitations of the study or review.
- Correlations being used to conclude that A causes B.
- Graphs and results being presented in a misleading way.

Next steps and key questions

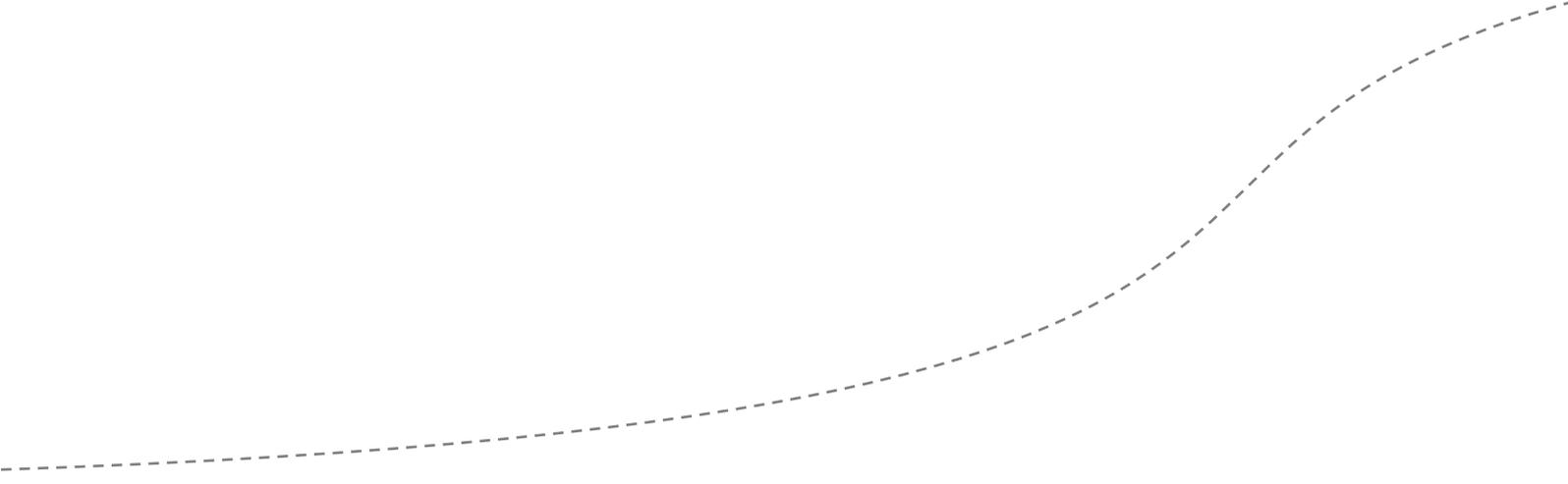
Once you have identified a problem you want to solve in school, you need to explore the evidence around the topic. It is also important to ask questions that are going to help you decide how the evidence can help in your context, and how you can implement positive change.

| Am I convinced by the evidence? | Is the evidence relevant to our school? | Should I apply this evidence in our school? |
|--|---|---|
| <p>What evidence is there that the new approach can provide valuable outcomes?</p> | <p>Has the approach worked in schools similar to our own that face similar challenges?</p> | <p>Is the approach relevant to school priorities?</p> |
| <p>Are conclusions based on solid evidence from lots of similar schools followed over time?</p> | <p>Has the research been carried out with pupils who have a similar profile to our pupils?</p> | <p>Is the advice specific enough to be implemented? Could the strategies be used in our school?</p> |
| <p>Is the author credible? Are they qualified and experienced in this area? Do they have biases or vested interests?</p> | <p>When was the research carried out? Have ideas changed since then? Is there new, up to date research?</p> | <p>Do we have enough information about implementation challenges and how to meet them?</p> |
| <p>Is the type of research suitable for the question we are asking?</p> | <p>Can we reasonably assess the costs and prospective rewards in our setting?</p> | <p>Do we have enough information about what supported implementation? Are we able to replicate those supporting factors in our school?</p> |
| <p>How robust is the evidence?</p> | | |
| <p>From what is written, are you able to understand the practice that was evaluated, what was measured, who the participants were?</p> | | <p>Is the advice practical for our school given our capabilities and resources?</p> <p>Are we able to monitor the impact of implementation in our school setting?</p> |

Useful places to source evidence

- Best Evidence in Brief www.beib.org.uk
- Best Evidence Encyclopedia www.bestevidence.org.uk
- Campbell Collaboration <https://campbellcollaboration.org/>
- Chartered College of Teaching <https://chartered.college/>
- Deans for Impact <https://deansforimpact.org/>
- Education Endowment Foundation Guidance Reports
www.educationendowmentfoundation.org.uk/tools/guidance-reports/
- Education Endowment Foundation Teaching and Learning Toolkit
<https://educationendowmentfoundation.org.uk/evidence-summaries/teaching-learning-toolkit/>
- EPPI-Centre <https://eppi.ioe.ac.uk/cms/>
- Evidence for Impact www.evidence4impact.org.uk
- Institute for Education Sciences <https://ies.ed.gov/>
- Research Schools Network <https://researchschool.org.uk/>
- Teacher Development Trust <https://tdtrust.org/>
- The Learning Scientists <http://www.learningscientists.org/>
- What Works Clearinghouse <https://ies.ed.gov/ncee/wwc/>





Contact us

+44 (0)1904 328166 info@the-iee.org.uk
Berrick Saul Building, University of York, York YO10 5DD
Twitter: [@IEE_York](https://twitter.com/IEE_York) the-iee.org.uk/

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Empowering educators with evidence

