

The role of evidence in teaching and learning



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Abstract

Highly-effective teaching requires evidence-informed decision making at crucial points in the teaching process. First, effective teachers use quality evidence to establish the points individual learners have reached in their learning. This enables teachers to identify starting points for further teaching and learning and to ensure that each student is given learning opportunities at an appropriate level of challenge. In contrast, much teaching instead assumes all students will be appropriately challenged by common year-level curricula. The process of establishing and understanding where students are in their learning often requires detailed diagnostic evidence of individual misunderstandings and obstacles to learning progress. Second, highly effective teachers have a repertoire of evidence-informed teaching strategies and select from these to engage individual students, set ambitious but realistic learning goals and target teaching to address individual learning needs. Third, effective teachers use evidence to monitor the progress individuals make in their learning over extended periods of time. They use evidence of progress to assess the adequacy of an individual's learning, to intervene when progress is inadequate and to evaluate the effectiveness of their own teaching strategies and interventions. In using evidence in these ways, highly effective teachers work with colleagues to build knowledge about better ways to use evidence to promote every student's growth.

Introduction

Evidence-based teaching involves the use of evidence to: (1) establish where students are in their learning; (2) decide on appropriate teaching strategies and interventions; and (3) monitor student progress and evaluate teaching effectiveness.

The term 'evidence-based' is now firmly entrenched in the education lexicon. And with good reason; improvements in student learning and educational outcomes depend on the wider use of reliable evidence in classroom practice. However, much discussion of evidence-based teaching is based on a narrow definition that would benefit from a broader recognition of the role of evidence in teaching and learning.

The concept of evidence-based practice has its origins in medicine. The essential idea is that decisions made by medical practitioners should be based on the best available evidence collected through rigorous research – ideally, through randomised controlled trials. Research studies in the form of carefully controlled experiments are seen as providing the strongest and most dependable forms of evidence to guide practice.

However, everyday medical practice uses multiple forms of evidence. In addition to evidence from external research studies, medical practitioners gather and use evidence relating to patients' presenting conditions and symptoms – for example, by taking patient histories and ordering diagnostic tests. Evidence of this kind is essential to informed decision making. So, too, is evidence about the subsequent effectiveness of a practitioner's decisions. Such evidence plays a crucial role in monitoring a patient's progress and evaluating the impact of treatments and interventions.

Most definitions of evidence-based medicine recognise the role and importance of these different forms of evidence. One of the earliest and most cited definitions (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, pp. 70–1) describes evidence-based practice as 'integrating individual clinical expertise with the best available external evidence from systematic research'.

Evidence-based teaching similarly involves more than the implementation of practices that have been shown to be effective in controlled research studies. As in medicine, evidence-based practice depends on the integration of reliable, local, practitioner-collected evidence with evidence from systematic, external research. Policies and discussions of 'evidence-based teaching' sometimes overlook the importance of this broader, more integrated understanding of the role of evidence in teaching and learning.

Evidence to identify starting points for teaching and learning

A first, essential form of evidence for teaching is information about the points individual learners have reached in their learning. This usually means establishing what they know, understand and can do as starting points for teaching and to ensure that individuals are provided with well-targeted learning opportunities and appropriately challenging learning goals. The parallel in medical practice is diagnosing the state of a patient's health to guide appropriate treatment. Understanding where learners are in their learning is as essential to clinical teaching practice as understanding a patient's symptoms and health is to effective medical practice.

The process of establishing where students are in their learning may involve the review of available historical evidence – for example, evidence from a previous teacher or evidence from past assessments. It also may involve administering tests or other assessments to identify appropriate starting points.

One view of teaching – now largely outmoded – sees it merely as the delivery of the appropriate year-level curriculum to all students. Under this view, the role of teachers is to deliver the relevant curriculum; the job of students is to learn what teachers teach; and the role of assessment is to establish how well students have learnt what teachers have taught and to grade them accordingly. In contrast, 'evidence-based' teaching uses evidence about where students are in their learning to guide and personalise teaching. The objective is to develop a good understanding of where a student is in their learning so that they can be provided with appropriately targeted teaching and learning opportunities.

Evidence-based teaching of this kind depends on a frame of reference against which learning can be monitored – a 'roadmap' that describes and illustrates what it means to grow and become more proficient in a learning area. Learning is depicted as an ongoing process through which students develop progressively higher levels of knowledge, understanding and skill over extended periods of time.

In evidence-based teaching, assessments are undertaken to gather evidence and draw conclusions about where students are in their learning. The objective is to use observations of student performances and work to draw inferences about their current levels of attainment. A thorough understanding of where a student is in their learning may require a detailed diagnostic investigation of the errors they are making or the misunderstandings they have developed – often essential evidence for addressing obstacles to further progress and a key element of clinical teaching practice. Reports of student attainment are then expressed not

as percentages or grades, but as the points individuals have reached, interpreted by reference to what they know, understand and can do.

Evidence to inform teaching strategies and interventions

A second, powerful form of evidence for promoting student learning is evidence from research into effective teaching strategies and interventions. Knowing where students are in their learning provides a starting point; however, the crucial next question is how to promote further learning. Which interventions are likely to improve student levels of understanding and skill? What teaching strategies have been shown to work in practice? For which learners? Under what conditions? Answers to questions of this kind are derived from rigorous, systematic research and professional teaching experience.

As a general principle, effective teaching builds on and extends learners' existing knowledge, skills and understandings. Teachers need to know how to do this, which in turn depends on a deep understanding of the learning domain itself and, in particular, typical paths and sequences of student learning. How does learning build on prior learning and lay the foundations for further learning? How does prerequisite knowledge influence future learning success? What are the foundational, enabling skills that students must develop before they can progress to higher levels of attainment? Learning research has a crucial role to play in answering these questions, elucidating the nature of learning, in particular learning domains, and generating research evidence to inform teaching practice.

Research also has an important role to play in uncovering the kinds of misunderstandings and alternative conceptions that students commonly develop. Such research adds to an understanding of how learning occurs within a particular learning domain. As well as recognising typical and logical sequences of development, teachers require an appreciation of the side-tracks that some students go down and how these impede learning progress. Research that provides evidence in the form of insights into common errors and misconceptions assists teachers in diagnosing and addressing the difficulties that individuals experience.

Importantly, research evidence of these kinds is domain specific. Because teachers teach subjects, they generally benefit from research into how students learn those subjects. For example, the evidence likely to be most useful to teachers of reading is evidence about how students learn to read, including the role of pre-reading and early reading skills in establishing the foundations for subsequent reading development. The evidence likely to be most useful to teachers of science is evidence about how students progressively learn science, including evidence relating to the development

of deeper understandings of scientific concepts and principles, and the kinds of misunderstandings that students commonly develop.

'Evidence-based' educational practices sometimes take the form of general solutions such as 'individualised learning', 'early years intervention', 'metacognition', 'homework', 'peer tutoring' and 'feedback'. However, general solutions of these kinds must be interpreted and implemented in the contexts of the subjects teachers teach. What kind of homework? For whom? Feedback of what kind? When? In general, teachers require evidence about the best ways to implement effective teaching strategies and interventions in subject-specific contexts.

Evidence to evaluate student progress and teaching effectiveness

A third form of evidence for teaching is information about the progress students make in their learning over time. This is important information for evaluating learning success and for making judgements about the effectiveness of teaching strategies and interventions.

A traditional approach to evaluating learning is to compare students' performances with expectations based on their age or year level. For example, a Year 5 student's learning success is commonly assessed and graded against Year 5 performance expectations. However, this approach takes no account of where students are in their long-term learning at the beginning of a school year and so does not reflect the progress (or growth) they have made. Under this approach, two students may achieve the same grade, one having made significant progress during the year, the other having made very little.

An alternative is to define learning success in terms of the *progress* individuals make. This approach assumes that learning is reflected in, and can be evaluated in terms of, improvements in student levels of knowledge, understanding and skill – for example, over the course of a school year.

Evidence about the progress students make is crucial information for teaching. It provides a basis for establishing whether, and how effectively, individuals are learning. Low levels of progress may indicate lack of student effort and/or ineffective teaching, and so warrant closer investigation. Information about progress provides the most direct indicator of teaching effectiveness, as well as a basis for evaluating educational policies, programs and teaching methods.

Reference

Sackett, D. L., Rosenberg, W. M., Gray, J. A., Haynes, R. B., Richardson, W. S. (1996). Evidence based medicine: What it is and what it isn't. *BMJ*. 13;312(7023):71–2. <https://doi.org/10.1136/bmj.312.7023.71>