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Summary

More so than any generation before them, the child born today should benefit from rapid advances in the understanding of human development, and of how that development may be optimised. There has been an explosion of scientific knowledge about the individual in genetics and the neurosciences, but also about the role of environmental influences such as socio-economic status, early child rearing practices, effective teaching, and nutrition. However, to this point, there is little evidence that these knowledge sources form a major influence on policy and practice in education. There is a serious disconnect between the accretion of knowledge and its acceptance and systematic implementation for the benefit of this growing generation. Acceptance of a pivotal role for empiricism has been actively discouraged by many advisors to policymakers, whose ideological position decries any influence of science. There are unprecedented demands on young people to cope with an increasingly complex world. It is one in which the sheer volume of information, and the sophisticated persuasion techniques, to which they will be subjected may overwhelm the capacities that currently fad-dominated educational systems can provide for young people. A recognition of the proper role of science in informing policy is a major challenge for us in aiding the new generation. This perspective does not involve a diminution of the role of the teacher, but rather the integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction.

Main submission

Evidence-based practice and educational research Dr Kerry Hempenstall

It's hardly a revelation to argue that the adoption of evidence-based practice (EBP) in some other professions is far advanced in comparison to its use in education. That's not to say that the resistance displayed by some teacher organizations towards the adoption of EBP has not been evident in the early stages of its acceptance by those

professions, such as medicine and psychology. However, as these principles have been espoused in medicine and psychology since the early nineties, a new generation of practitioners have been exposed to EBP as the normal standard for practice. This has occurred among young practitioners because their training has emphasized the centrality of evidence in competent practice.

In education, unfortunately, there are few signs of this sequence occurring. Most teachers-in-training are not exposed to either the principles of EBP (unless in a dismissive aside) or to the practices that have been shown to be beneficial to student learning, such as the principles of instructional design and effective teaching, explicit phonological instruction, and student management approaches that might be loosely grouped under the behavioural or cognitive-behavioural banner. Education policies have begun to espouse EBP, but rarely define adequately what it means or how it might be implemented.

In my view, until educational practice includes EBP as a major determinant of practice, then it will continue to be viewed as an immature profession. It is likely that the low status of teachers in many western countries will continue to be the norm unless and until significant change occurs.

What does evidence-based practice in education mean?

Teaching has suffered both as a profession in search of community respect and as a force for improving a nation's social capital, because of its failure to adopt the results of empirical research as the major determinant of its practice. There are a number of reasons why this has occurred, among them a science-aversive culture endemic among education policymakers and teacher education faculties. There are signs that major shifts are occurring. There have been strong moves in Great Britain and the USA towards evidence-based practice in education in recent years. Indeed, the movement was further advanced by the edict from the US government's Office of Management and Budget (Zient, 2012) that requires the entire Executive Branch to use every available means to promote the use of "rigorous evidence in decision-making, program administration, and planning". Evidence-based practice has influenced many professions in recent years. A simple Google search produces over 73,000,000 hits. Among them, in varying degrees of implementation, are professions as diverse as medicine, psychology, agriculture, speech pathology, occupational therapy, transport, library and information practice, management, nursing, pharmacy, dentistry, and health care.

Several problems do require attention. The generally low quality of much educational research in the past made the process of evaluating the evidence difficult, particularly for those teachers who have not the training to discriminate sound from unsound research designs. Teacher training itself has not empowered

teachers with the capacity and motivation to explore how evidence could enhance their effectiveness.

Education has a history of regularly adopting new ideas, but it has done so without the wide-scale assessment and scientific research that is necessary to distinguish effective from ineffective reforms.

“More typically, someone comes across an idea she or he likes and urges its adoption… often the changes proposed are both single and simple – more testing of students, loosening certification requirements for teachers, or a particular school improvement model” (Levin, p.740).

“Most management decisions are not based on the best available evidence. Instead, practitioners often prefer to make decisions rooted solely in their personal experience. However, personal judgment alone is not a very reliable source of evidence because it is highly susceptible to systematic errors – cognitive and information-processing limits make us prone to biases that have negative effects on the quality of the decisions we make.” (Barends, Rousseau, & Briner, 2014, p.8)

This absence of a scientific perspective has precluded systematic improvement in the education system, and it has impeded growth in the teaching profession for a long time (Carnine, 1995; Hempenstall, 1996; Marshall, 1993; Stone, 1996). Years ago in Australia, Maggs and White (1982) wrote despairingly "Few professionals are more steeped in mythology and less open to empirical findings than are teachers" (p. 131).

Since that time, a consensus has developed among empirical researchers about a number of effectiveness issues in education, and a great deal of attention (Gersten, Chard, & Baker, 2000) is being directed at means by which these research findings can reach fruition in improved outcomes for students in classrooms. Carnine (2000) noted that education appears to be impervious to research on effective practices, and he was one of the first to explore differences between education and other professions, such as medicine that are strongly wedded to research as the major practice informant.

“Evidence-based practice involves conscientious, explicit, and judicious use of the best available evidence in making decisions (Sackett 2000). Individuals, both laypeople and professionals, typically use some form of evidence in making decisions—if only their past experience. EBP raises the issue of what that evidence is and, in particular, how strong it might be (Barends, et al 2014; Sackett 2000). Evidence-based practitioners seek to improve the quality of the evidence used and condition their decisions and practices on the confidence that the evidence warrants. Importantly, effective EBP practice requires a commitment to continuous practice improvement and lifelong learning (Straus et al 2005).” (Rousseau & Gunia, 2015, p. 5)

“Evidence based practice seeks to improve the way decisions are made. It is an approach to decision making and day to day work practice that helps educators – be it teachers, heads of department or senior leaders to critically evaluate the extent to which they can trust the evidence they have at hand. It also helps educators to identify, find and evaluate additional evidence relevant to their decisions.” (Jones, 2016, p.6)

History

In an initiative similar to that taken in medicine during the 1990’s, the American Psychological Association (Chambless & Ollendick, 2001) introduced the term empirically supported treatments as a means of highlighting differential psychotherapy effectiveness. Prior to that time, many psychologists saw themselves as developing a craft in which competence arises through a combination of personal qualities, intuition, and experience. The result was extreme variability of effectiveness among practitioners.

Their idea was to devise a means of rating therapies for various psychological problems, and for practitioners to use these ratings as a guide to practice. The criteria for a treatment to be considered well-established included efficacy through two controlled clinical outcomes studies or a large series of controlled single case design studies, the availability of treatment manuals to ensure treatment fidelity, and the provision of clearly specified client characteristics. A second level involved criteria for probably-efficacious treatments. These criteria required fewer studies, and/or a lesser standard of rigor. The third category comprised experimental treatments, those so far without sufficient evidence to achieve a higher status.

The American Psychological Association’s approach to empirically supported treatments could provide a model adaptable to the needs of education. There are great potential advantages to the education system when perennial questions are clearly answered. What reading approach is most likely to evoke strong reading growth? Should "social promotion" be used or should retention in one's grade be the norm when a year is failed? Would smaller class sizes make a difference? Should summer school programs be provided to struggling students? Should kindergarten be full day? What are the most effective means of providing remediation to children who are falling behind? Even in psychology and medicine, however, it should be noted that 15 years later there remain pockets of voluble opposition to the evidence-based practice initiatives.

The first significant indication of a similar movement in education occurred in the USA with the Reading Excellence Act (The 1999 Omnibus Appropriations Bill, 1998) that was introduced as a response to the unsatisfactory state of reading attainment in the USA. It acknowledged that part of the cause was the prevailing method of reading instruction, and that literacy policies had been insensitive to developments

in the understanding of the reading process. The Act, and its successors, attempted to bridge the gulf between research and classroom practice by mandating that only programs in reading that had been shown to be effective according to strict research criteria would receive federal funding. This reversed a trend in which the criterion for adoption of a model was that it met preconceived notions of "rightness" rather than that it was demonstrably effective for students. Federal funding was to be only provided for the implementation of programs with demonstrated effectiveness - evidenced by reliable, replicable research.

Reliable replicable research was defined as objective, valid, scientific studies that: (a) include rigorously defined samples of subjects that are sufficiently large and representative to support the general conclusions drawn; (b) rely on measurements that meet established standards of reliability and validity; (c) test competing theories, where multiple theories exist; (d) are subjected to peer review before their results are published; and (e) discover effective strategies for improving reading skills (The 1999 Omnibus Appropriations Bill, 1998).

A term sometimes used as a synonym for evidence-based is research-based. It is important that the definition of research-based be analysed, as in some contexts it represents a weaker standard. The definition of evidence-based includes the criterion that a program has been tested in the appropriate population and has been found to be effective. Sometimes research-based programs have not met this criterion, but have simply been constructed, based on components that have been shown to be effective in other validated programs.

However, the components are only the ingredients for success in evidence-based programs, and copying some or all components might not lead to success. Having all the right culinary ingredients doesn't guarantee a perfect soufflé. There are other issues, such as what proportion of each ingredient is optimal, when should they be added, how much stirring, heating, cooling are necessary? Errors in any of these requirements lead to sub-optimal outcomes.

Take, for example, literacy programs. "Yet there is a big difference between a program based on such elements and a program that has itself been compared with matched or randomly assigned control groups" (Slavin, 2003). Because a program has some/all of the elements doesn't necessarily mean that it will be effective. Engelmann (2003) points to the logical error of inferring a whole based upon the presence of some or all of its elements. Engelmann is critical of merely "research-based" programs, that is, programs constructed only to ensure each respected component is somewhere represented. He points out that this does not guarantee effectiveness.

So for a true measure, we must look also for empirical studies showing that a particular combination of theoretically important elements is indeed effective in practice.

In England, similar concerns about approaches lacking in evidence produced the National Literacy Strategy (Department for Education and Employment, 1998) that mandated teaching approaches based upon research findings. For example: "There must be systematic, regular, and frequent teaching of phonological awareness, phonics and spelling" (National Literacy Strategy, 1998, p.11).

In practice, this edict suffered from strong resistance from within the education industry (e.g., teacher education, publishers, whole language protagonists, teacher professional associations) and did not achieve its objectives. Following the influential Rose Report (2006), a new even more directive approach was instituted across the nation, and was known as the Primary National Strategy (2006).

In Australia, the National Inquiry into the Teaching of Literacy (2005) also reached similar conclusions about the proper role of educational research. The Australian Government's Review of Funding for Schooling Panel (2011) bemoaned the current lack of evidence-basis for educational programs and the absence of evaluation of the programs' effects on learning (Nous Group, 2011).

Slavin (2002) argued that the decision to require evidence prior to program adoption would reduce the pendulum swings that had characterized education thus far, and could produce revolutionary consequences in reducing the wide range of educational achievement differences across our community wrought by teacher and program variability.

The National Research Council's Center for Education (Towne, 2002) suggested that educators should attend to research that (a) poses significant questions that can be investigated empirically; (b) links research to theory; (c) uses methods that permit direct investigation of the question; (d) provides a coherent chain of rigorous reasoning; (e) replicates and generalizes; and (f) ensures transparency and scholarly debate. The Council's message was clearly to improve the quality of educational research, and reaffirm the link between scientific research and educational practice. Ultimately, the outcomes of sound research should inform educational policy decisions, just as a similar set of principles had been espoused for the medical profession. The fields that have displayed unprecedented development over the last century, such as medicine, technology, transportation, and agriculture have been those embracing research as the prime determinant of practice (Shavelson & Towne, 2002).

So, evidence-based practices are: " … practices that are supported by multiple, high-quality studies that utilize research designs from which causality can be inferred and

that demonstrate meaningful effects on student outcomes" (Cook & Cook, 2011, p. 73).

Similarly, in Australia in 2005, the National Inquiry into the Teaching of Literacy asserted that "teaching, learning, curriculum and assessment need to be more firmly linked to findings from evidence-based research indicating effective practices, including those that are demonstrably effective for the particular learning needs of individual children" (p.9). It recommended a national program to produce evidence-based guides for effective teaching practice, the first of which was to be on reading.

"Recommendation 5: The committee recommends that the Minister take up with Universities Australia the need to encourage a more rigorous and evidence-based approach to the preparation of trainee teachers in regard to literacy and mathematics method" (p.64).

In all, the Report used the term evidence-based 48 times. Unfortunately, in Australia, this potentially game-changing report has never been adopted by any government.

So, the implication is that education and research are not adequately linked in Australia. Why has education been so slow to attend to research as a source of practice knowledge? Carnine (1991) argued that the leadership has been the first line of resistance. He described educational policy-makers as lacking a scientific framework, and thereby inclined to accept proposals based on good intentions and unsupported opinions. Professor Cuttance, director of the Melbourne University's Centre for Applied Educational Research was equally blunt: "Policy makers generally take little notice of most of the research that is produced, and teachers take even less notice of it." (Cuttance, 2005, p.5).

A recent study highlighted other potential hurdles within organisations. The Callen et al. (2017) study identified 3 barriers that policymakers must overcome in order to use the evidence that development researchers produce. First, their ability to interpret evidence was found to be lacking. Neither the policy makers nor their department staff were adept at analysing or interpreting data. Though they reported a belief in the potential value of consulting research, their organisational culture demanded decisions too quickly to enable careful analysis. Further, there was no value placed on research at the senior levels, many of whom were resistant to any change. Finally, decisions about the value of employing research findings tended to depend on whether the research-based finding were consistent with the policy-makers prior beliefs.

Carnine (1995) pointed to teachers' lack of training in seeking out and evaluating research for themselves. Most teacher training institutions have not developed a research culture, and tend to view teaching as an art form - in which experience, personality, intuition, and creativity are the sole determinants of practice. For

example, he estimated that fewer than one in two hundred teachers are experienced users of the ERIC educational database.

“The findings indicated that ...evidence-based interventions including explicit instruction, cognitive strategy instruction, content enhancements, and independent practice opportunities were reported infrequently. … Finally, universities, school districts, and educational service centers are encouraged to provide sustained professional development in strategies that contribute to independent learning and RTI to reduce the research to practice gap in special education.” (Ciullo et al., 2016, p. 44-45)

“Key Findings regarding teacher educators’ views on education

- They are far more likely to believe that the proper role of teacher is to be a "facilitator of learning" (84 percent) not a "conveyor of knowledge" (11 percent).
- Asked to choose between two competing philosophies of the role of teacher educator, 68 percent believe preparing students "to be change agents who will reshape education by bringing new ideas and approach to the public schools" is most important; just 26 percent advocate preparing students "to work effectively within the realities of today's public schools."
- Only 24 percent believe it is absolutely essential to produce "teachers who understand how to work with the state's standards, tests, and accountability systems."
- Just 39 percent found it absolutely essential "to create teachers who are trained to address the challenges of high-needs students in urban districts." Just 37 percent say it is absolutely essential to focus on developing "teachers who maintain discipline and order in the classroom."
- The vast majority of education professors (83 percent) believe it is absolutely essential for public school teachers to teach 21st century skills, but just 36 percent say the same about teaching math facts, and 44 percent about teaching phonics in the younger grades. (Farkas & Duffett, 2011, p. 8-9)

Conclusion

Given the above, it is clear that if we are to advance Australia's educational system, changes are required at the levels of policy, state and national administration, teacher education, schools and school districts - and most crucially - what occurs in classrooms across the nation.

Reference list available on request.