

A Collaborative Approach to Knowledge Building to Strengthen Policy and Practice in Education:

The New Zealand Iterative Best Evidence Synthesis Programme

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Abstract

There is a valuable but inaccessible and fragmented research literature in education about approaches that enhance or undermine social and academic outcomes for diverse learners. The focus of this paper is on a national collaborative knowledge building strategy to draw upon and synthesise this literature: the New Zealand *Iterative Best Evidence Synthesis (BES) Programme*¹. The approach aims to strengthen the use of evidence-based approaches in both educational policy and practice. This paper explains the ways in which a fitness-for-purpose approach has driven the methodology and the processes used in the Iterative BES Programme. Because the purpose is to inform educational development, the focus is on what works, and specifically on what can be learned from the evidence about what works, under what conditions, why, and how. Attention is given to the magnitude of impact of influences. Particular attention is given to strengthening the evidence-base about the nature of educational change and the processes that support educational development. The Iterative BES approach draws upon collaborative processes between researchers, policy-makers, and educators. These processes are helping to strengthen capability in research and development and to achieve policy relevance and accessibility for educators. The paper concludes by raising questions for researchers about their roles in contributing to collaborative knowledge building that can make a positive difference in education.

Key words: evidence, collaboration, policy, practice, development

¹ www.minedu.govt.nz/goto/bestevidencesynthesis

Introduction

This paper¹ foregrounds current and future challenges for New Zealand education policy and practice. It is argued that such challenges require fit-for-purpose knowledge building approaches to inform what works for diverse learners in New Zealand contexts. The paper outlines both the problems inherent in the task of drawing on educational research to strengthen the evidence base, and the potential of collaborative syntheses of 'bodies of evidence' as catalysts for multi-level system improvement.

Substantial attention is given in the paper to methodological issues. The paper advances the case for a rigorous pluralist approach to synthesising and explaining evidence about the complexity of influences on a range of outcomes for diverse learners.

Attention is also given to the need for a deepened evidence-based understanding of educational change processes. The paper outlines the Iterative Best Evidence Synthesis Programme² as a cumulative and iterative knowledge building approach. The paper explains that the programme not only seeks to strengthen the evidence-base about what works, but also seeks to inform the need to be evidence-based about using the evidence-base in order to be effective in educational development.

The latter section of this paper explains how a range of iterative and collaborative partnerships and processes are strengthening both the approach to, and the impact of, this work. The paper highlights current challenges and future directions of the programme.

The paper concludes with implications for what might be considered quality in educational research when the aim is knowledge building that can make a positive difference for diverse learners in education

The New Zealand Context

New Zealand is a small Pacific OECD country with an overall population of just over four million and a high youth population³. The OECD's *Programme for International Student Assessment* (PISA) reveals the third highest mean achievement in reading literacy for 15-year-old students in New Zealand, but the dispersion of achievement scores is second widest out of 30 countries. Although the PISA results showed wider disparities for New Zealand than Australia, Australia's performance in PISA also falls into the high quality/low equity quadrant⁴ (see Figure 1). A wide dispersion of achievement is a recurrent pattern for New Zealand in international comparative studies.

New Zealand population projections reveal a rapidly changing demographic profile by ethnic identity. Our children increasingly bring multiple cultural heritages to their education. And, whereas the majority of learners in the early childhood and schooling systems have been Pakeha (of European heritage), Māori and Pasifika learners will constitute about 45% of our children by 2021 and the majority of our young learners within three or more decades⁵.

¹ This paper is an updated version of a Alton-Lee, A. (2004, April). *Improving educational policy and practice through an Iterative Best Evidence Synthesis Programme*. Paper prepared for OECD-US Seminar on Evidence-Based Policy. Washington D.C. Web site:

<http://www.excel.gov.org/displayContent.asp?NewsItemID=5205&Keyword=prppcEvidence>

² The New Zealand Ministry of Education's *Iterative Best Evidence Synthesis Programme* owes a debt of gratitude to, is inspired by, but is quite different from Slavin's best evidence synthesis approach. See Slavin, R. (1986). Best-evidence synthesis: An alternative to meta-analysis and traditional reviews. *Educational Researcher*. 15(9), 5-11.

³ The fourth highest in OECD countries after Mexico, Turkey and Iceland. See Indicator A1. *Education at a Glance: OECD Indicators 2001*. Paris: OECD. [Not updated in OECD Indicators 2002].

⁴ Source: OECD (2001). Knowledge and skills for life, Appendix B1, Table 2.3a, p.253, Table 2.4, p.257.

⁵ <http://www.stats.govt.nz/>

Despite high achievement for many Māori and Pasifika learners, average achievement as shown in PISA and many other assessments is lower for these ethnic groups.

The policy challenge for educational improvement in New Zealand is sustainable, system-wide development that produces learner outcomes exemplifying high quality and high equity. The challenge for practice is to simultaneously educate diverse learners for success in a knowledge society.



Overall Performance - New Zealand's High Average and Large Variance

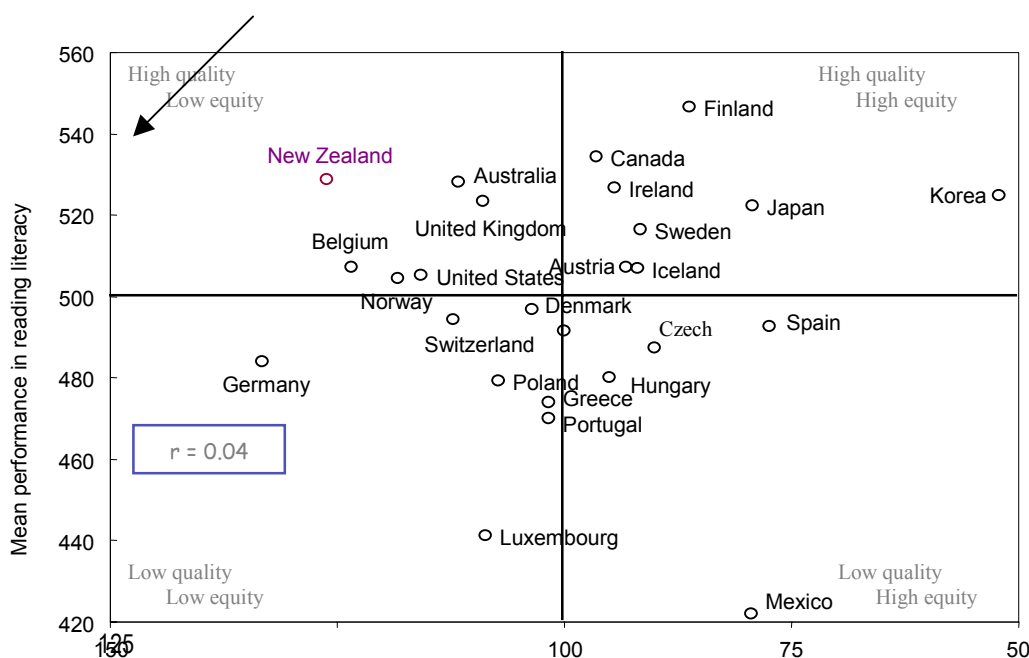


Figure 1. Variation expressed as percentage of average variation across the OECD

Source: OECD (2001) Knowledge and skills for life, Appendix B1, Table 2.3a, p.253, Table 2.4, p.257.

Knowing What We Know About What Works in Education

When public policy looks to, or seeks to commission, educational research or evaluation to inform policy development, it is clear that knowing what we know about what works is fraught. There are bodies of research that influence educational practice, but do not provide rigorous evidence of a positive impact on learner outcomes. For example, there is considerable international evidence^{6,7,8,9} of no strongly positive (and even negative) impacts

6 Irvine, J. J., & York, D.E. (1995). Learning styles and culturally diverse students: A literature review. In J. Banks, & C. McGee (Eds.). *Handbook of Research on Multicultural Education*. MacMillan Publishing. (p. 487).

7 Riding, R., & Rayner, S. (1998). *Cognitive styles and learning strategies*. London: David Fulton Publishers.

8 McMillan, B. (2001). The serious limitations of 'learning style'. *SET* (1) 36-39.

9 The term 'learning style' is often used loosely in practice but in this context denotes a learner's apparent preference for an auditory, visual, tactile or other source and/or expression of information (identified through a learning styles inventory). Within this approach teachers are encouraged to match mode of information to the learner's preference. A review by Irvine and York (1995) of evidence about 30 instruments to measure learning styles, concluded that, despite the popularity of the Learning Styles Inventory⁹ 'the design strategy, reliability and validity of the inventory were largely unsupported by the research evidence' (p.487). Riding and Rayner (1998) and McMillan (2001) highlight several concerns including distracting teacher attention from the actual learning process, and the potential to restrict opportunities to learn.

when teachers use learning styles approaches. The intention behind the approach is undoubtedly good, but even those¹⁰ who argue they have found significant evidence of effectiveness, tend to emphasise a multi-sensory approach (auditory, visual, kinaesthetic and so on) rather than a preference-matching approach.

A 2003 report by the New Zealand Education Review Office¹¹ showed that the learning styles approach was commonly used in New Zealand schools. In a series of case studies (Higgins, 2001)¹² the approach has been found to be linked to less effective instructional experiences for Māori and Pasifika than for other learners in junior class mathematics. Māori and Pasifika learners were classified as kinaesthetic learners and encouraged to work with blocks while other learners focussed on metacognitive strategies (for which there is, by contrast, strong research evidence of positive links to higher achievement)¹³.

Even when it is clear that public policy needs an evidence base that is trustworthy about influences on learner outcomes, it is not easy for policy makers to systematically access such an evidence base. With notable exceptions such as the journal SET Research Information for Teachers, educators in early childhood and schooling in New Zealand are likely to be unable to gain ready access to research studies. The international research literature in education is widely dispersed in educational journals and tends to be specific to particular topics, particular research designs and methodologies, and located within particular paradigms. The research literature is characterised by paradigm silos (for example, between educational psychology and the sociology of education). The problems of siloing in turn constrain research literature reviews, drawing the charges of idiosyncrasy¹⁴ and untrustworthiness¹⁵ for policy purposes.

The international research provides a substantial resource for public policy in a small economy. But, when using international research, educators and policy-developers need to know if what the evidence indicates works in other countries would apply in one's own context, given regulatory, policy, institutional, cultural, language, professional and other contextual differences between countries.

What of our New Zealand educational research? Educational research in New Zealand tertiary institutions, with notable exceptions, is also subject to traditional siloing. An OECD Review (2001)¹⁶ warned of undermined social capital (in the form of networks and relationships fostering trust and reciprocity) in New Zealand educational research. Such factors can mitigate against the policy endeavour of getting professional agreement amongst researchers around evidence-based advice for improving practice (for example, in approaches to teaching reading, and around larger issues such as the agency of schools or teachers).

Further, much valuable educational research that is directly relevant to the New Zealand context has not become part of a cumulative tradition of knowledge building. Despite substantial public expenditure on postgraduate research (much of which is carried out by practising educators) research knowledge in educational doctoral and masters research

10 For example: Farkas, R.D. (2003). Effects of traditional versus learning-styles instructional methods on middle school students. *The Journal of Educational Research*, 97(1), 42-51.

11 Education Review Office. (2003). *Māori in Mainstream Schools*. Wellington: Education Review Office.

12 Higgins, J. (2001). *Developing numeracy: Understanding place value*. Report to the Ministry of Education. Wellington: Ministry of Education.

13 Alton-Lee, A. (2003). *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington: Ministry of Education.

14 Nutley, S., Davies, H., & Walter, I. (2002). *Evidence based policy: Cross-sector lessons from the UK*. Keynote paper for the Social Policy Research and Evaluation Conference, Wellington, NZ (conference postponed to 2003). University of St. Andrews, Scotland.

15 Oakley, A. (2002). Social science and evidence-based everything: The case of education. *Educational Review*, 45(3), 277-286.

16 OECD (2001). *OECD Review: Educational Research and Development Policy in New Zealand, Examiners Report*. CERI/CD(2001)4. Paris: OECD.

studies in New Zealand is held by Universities, subject to librarian supervision if accessed, and infrequently used to inform public policy or educational practice.

The Ministry of Education's Iterative Best Evidence Synthesis¹⁷ (BES) Programme

The focus of this paper is on a knowledge building strategy to assist in the project of strengthening the accessibility and use of rigorous evidence-based research in education through the *Iterative Best Evidence Synthesis Programme* developed by the New Zealand Ministry of Education since 2002. Its purpose is to systematically identify, evaluate, analyze, synthesise, and make accessible, relevant evidence linked to a range of learner outcomes. The aim is to do so in a timely manner to support the optimising of desirable outcomes for the diverse learners in the New Zealand education system. The overall programme requires a series of syntheses, systems-thinking about inter-relationships among influences, and attention to direct and indirect influences on outcomes (See Figure 2 on page 9).

A fitness-for-purpose approach has driven the development of the methodology. For example, because a primary purpose is to illuminate educational influences that can make a bigger difference for desirable learner outcomes, the selection criteria focus on research that links influences to learner outcomes. Because the purpose is to make a bigger difference in education, the focus is on what works, and specifically on what can be learned from the evidence about what works, under what conditions, why, and how.

To achieve its purpose to specifically inform the New Zealand context, the synthesis approach needs to foreground New Zealand educational research, triangulate patterns in the international research with the New Zealand evidence, and interrogate international research in the light of context-specific similarities and differences. Synthesis writers need to be mindful of patterns of systematic underachievement in New Zealand education, and the exceptions to these, in the selection of studies. A *Responsiveness to Diversity Framework* addresses current system weakness in New Zealand education (the wide dispersion of achievement) and government's need for future-focussed attention to the increasing diversity of our learners, and learner groups. This means attention to the ways in which educational processes simultaneously influence diverse learners (where all learners are included under the diversity umbrella). The responsiveness to diversity framework influences each aspect of the BES development including the selection of studies and the analysis. Evidence-based approaches can provide strategies to enable teachers to facilitate the learning of heterogeneous groups of learners in ways that can reduce teacher stress while enhancing a range of learner outcomes across the whole group of students (Alton-Lee, 2003¹⁸; Cawelti, 1999¹⁹).

To achieve our BES purposes we have developed a 'jigsaw methodology' that evaluates, sorts, and synthesises evidence about influences on learner outcomes from different paradigms, research designs and so on, with attention to the wider role of contextual influences. The 'jigsaw methodology' involves bringing together pieces of the puzzle about influences on learner outcomes that are often spread over and embedded within a range of research studies. The approach calls for attention to apparently conflicting evidence for its potential to deepen understanding and illuminate the impacts of context.

17 The New Zealand Ministry of Education's *Iterative Best Evidence Synthesis Programme* owes a debt of gratitude to, is inspired by, but as is explained in this paper, is quite different from Slavin's best-evidence synthesis approach. See Slavin, R. (1986). Best-evidence synthesis: An alternative to meta-analysis and traditional reviews. *Educational Researcher*. 15(9), 5-11.

18 Alton-Lee, A. (2003). *Quality teaching for diverse students in schooling: Best evidence synthesis*. Wellington: Ministry of Education.

19 Cawelti, G. (1999) (2nd edition). *Handbook of research on improving student achievement*. Arlington, VA: Educational Research Service. (This is the handbook selected for use by UNESCO).

Because our purpose is to understand what works in the change process, as well as in everyday practice, considerable emphasis is given to explanatory coherence and power both of particular knowledge claims and patterns of findings emerging from the synthesis. Particular weight is given to longitudinal findings indicating that achievements and social outcomes are sustained rather than transitory. Evidence from studies, whether small case studies, or larger longitudinal or experimental studies, is included in the synthesis only if there is a rigorous and credible link between the influence and learner outcomes, with some explicit exceptions.

Other research evidence such as descriptive research may be included, with qualification, if careful triangulation with other outcomes-linked studies provides confidence that the evidence adds to our understanding. For example, teacher provision of appropriate positive feedback has been found to show a particularly strong link to achievement in a range of reviews and meta-analyses of international studies (e.g. Hattie, 1999²⁰; Black and Wiliam, 1998²¹; and Marzano, Pickering and Pollock, 2001²²). In a descriptive study of New Zealand practice, Carkeek, Davies and Irwin (1994)²³ found that Māori students got markedly more frequent and positive feedback in immersion programmes than in bilingual or mainstream programmes. The triangulation of the NZ findings with the patterns in the international research suggests Māori students may have been getting less effective teaching in mainstream and bilingual settings, than in Māori-immersion settings²⁴, at least in the schools and classes studied.

The iterative BES draws on analyses of patterns and exceptions in the findings, analyses of comparative magnitude of impact of various influences, and consideration of explanatory coherence to interrogate and synthesise the body of evidence with relevance for the NZ context. Part of the analytic task in a synthesis is to use temporal comparisons to consider how contextual influences vary across time, according to changes in policy settings, and in communities.

A fitness-for-purpose approach has also driven the format of syntheses. The language used to report a synthesis is designed to be as accessible as possible for policy makers, educators, researchers, teacher educators and educational leaders, without sacrificing necessary precision.

All governments concerned about outcomes for their learners need timely cost-effective advice to inform policy development. Accordingly, despite the intrinsically challenging nature and scope of synthesis generation, there are time constraints on development. Our approach has been to work collaboratively with synthesis writers, and to use intensive formative quality assurance to generate rigorous and valid first iteration syntheses. The principle of transparency is employed to make the methodological approach clear, and links between claims and evidence transparent (through on-page footnoting) to enable further iterative processes of scrutiny and development by the New Zealand research community and

20 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand.

21 Black, P., & William, D. (1998). *Inside the black box: Raising standards through classroom assessment*. London: King's College, School of Education.

22 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

23 Carkeek, L., Davies, L., & Irwin, K. (1994). *What happens to Māori girls at school? An ethnographic study of the school-based factors affecting the achievement of Māori girls in immersion, bilingual, and mainstream primary school programmes in the Wellington Region*. Final Report to the Ministry of Education. Wellington: Ministry of Education.

24 The higher performance of Māori students at 5th and 6th form level in Māori medium and bilingual schools, compared with the performance of Māori students in immersion or bilingual units within mainstream schools in 2001 and 2002, may provide an indicator about the importance of this factor for Māori students. Minister of Education. (2001). *New Zealand Schools Nga Kura o Aotearoa: A report on the compulsory school sector in New Zealand 2000*. Wellington: Ministry of Education.

overseas research specialists. The intention of the programme is to build a successive process of updating and strengthening of the scope, comprehensiveness, validity and usefulness of the syntheses through further iterations.

The NZ Ministry of Education recognises that this work is challenging and requires capability development. The work also requires collaborative processes within the educational research community and between researchers, educators and policy-makers to achieve syntheses that are trustworthy and meet their purposes.

Three national advisory groups have been established to support methodological development in the BES work: the BES Standards Reference Group, the BES Māori Educational Research Advisory Group and the BES Pasifika Educational Research Advisory Group. The groups include BES writers, quality assurers, research methodologists, teacher union representatives, educational researchers and policy advisers. These advisory groups draw on the expertise of educational researchers across New Zealand Universities, Wananga, Colleges of Education, the teacher unions and the New Zealand Council of Educational Research. Representatives from other government agencies are also brought into the process to strengthened shared understandings about the development of the knowledge base.

The initial role of the advisory groups has been to scrutinise, critique and further develop the methodology to ensure its fitness-for-purpose for the New Zealand context. There has been wide agreement around the need for the iterative BES programme and about its purposes in informing policy and practice. Such agreement provides a strong foundation for addressing contested issues around research selection, validity, rigour and approach. This advisory process affords a wider range of expertise to address specific issues of the validity, rigour and explanatory power of different research methods and particular research designs across research paradigms. Additional assistance has been sought from a leading academic in the philosophy of social science research to further inform the scientific realist view that has informed the BES methodology (Haig, 2004)²⁵

The Ministry of Education has collaborated with the reference and advisory groups to develop first iteration agreed guidelines for BES writers. As the approach develops, through use and reflection the *Guidelines*²⁶ will evolve. The Ministry of Education has also allocated funding for advisors and formative quality assurance to the writers of the next tranche of BES iterations. Via this mechanism substantial expertise across the advisory groups is also becoming directly available to each BES development. This strategy is building social capital across the educational research community as it requires researchers and advisers who may have been somewhat siloed within their own research or educational practice interests, to engage in a shared dialogue about what works. The strategy is intended to enable a capability development strategy, to optimise the usefulness and accessibility of the BESs and to build wider ownership of the evidence about ‘what works’ across the education community.

Origin of the NZ Iterative BES Programme

The iterative BES approach originated out of strategic work to develop education system indicators and to inform medium-term strategy work in policy development. The programme is itself a development from a former initiative (the *Strategic Research Initiative*) where policy

25 Haig, B. (2004). *Methodological considerations for generating Best Evidence Synthesis Iterations*. Unpublished paper prepared for the Ministry of Education's Iterative Best Evidence Synthesis Programme. Christchurch; Department of Psychology, University of Canterbury. Available upon request from adrienne.altonlee@minedu.govt.nz

26 Ministry of Education (2004). *Guidelines for generating a best evidence synthesis iteration*. Wellington: Ministry of Education. Available from adrienne.altonlee@minedu.govt.nz.

and research sections of the Ministry of Education worked collaboratively to commission a set of nine literature reviews to better inform policy. Those literature reviews helped to identify key priorities and key themes to strengthen policy development. The *Strategic Research Initiative* also highlighted the potential for drawing upon a far wider research literature in informing policy and has signalled significant gaps in the evidence.

Although allowing a more systematic approach to evidence-based policy, there were inherent weaknesses in the one-off literature review approach such as those identified by Oakley (2002)²⁷. For example, Oakley analysed the extent to which six reviews focussed on health education exhibited idiosyncratic search strategies. Out of 137 studies considered across the six reviews only two studies were common to all six reviews. Oakley’s critique highlighted the need for policy developers and the external research community to collaborate to strengthen dimensions of rigour, trustworthiness, comprehensiveness, relevance and other fitness-for-purpose²⁸ requirements through a transparent and fit for purpose methodology. Given the challenges inherent in the task and the reality that new research evidence is constantly becoming available, it was argued that an evidence-based knowledge building approach should be iterative both in the development of the methodology for creating syntheses and in the content of the syntheses.

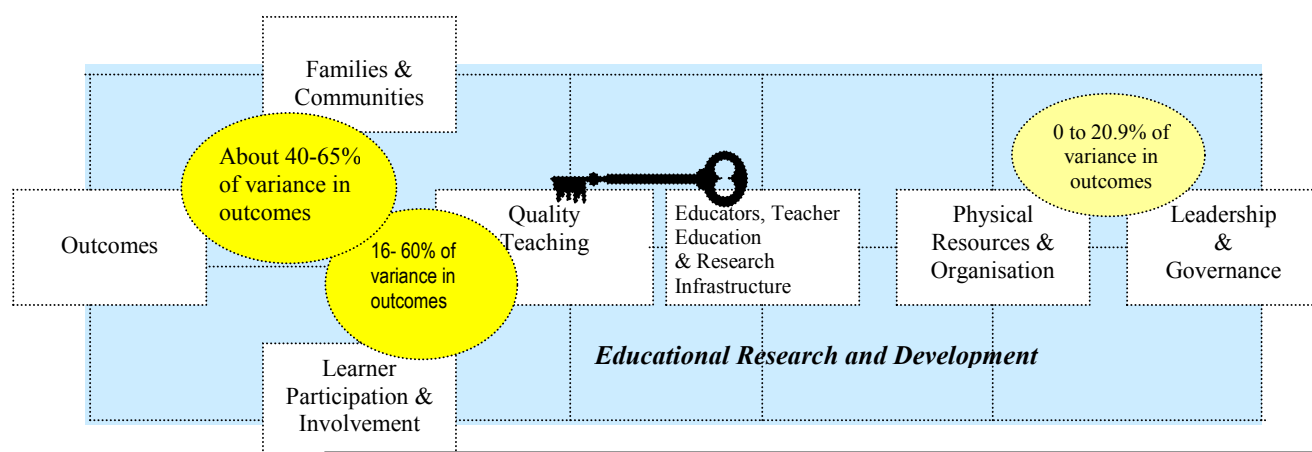


Figure 2. *Education Indicators Framework for Early Childhood and Schooling Sectors*

The New Zealand Ministry of Education’s *Education Indicators Framework* shown in Figure 2 depicts major influences on learner outcomes and the dotted lines depict inter-relationships between these. The framework assists with a systems approach to thinking about sustainable development in education. This version of the framework makes visible, although unclear, the role played by research and development, and the inter-relationship between these in contributing to sustainable progress in education.

A risk identified in the development of system indicators internationally has been the goal displacement that can occur in policy and practice when an indicator (inadvertently) does not focus on an influence that matters.^{29,30} To avoid such a risk, there is a need to be systematic

27 Oakley, A. (2002). Social science and evidence-based everything: The case of education. *Educational Review*, 45(3), 277-286.

28 Boaz, A., & Ashby, D. (2003). *Fit for purpose? Assessing research quality for evidence based policy and practice*. Working Paper 11. London: ESRC UK Centre for Evidence Based Policy and Practice.

29 Hutmacher, W., Cochrane, D., Bottani, N. (2001). *In Pursuit of Equity in Education: Using International Indicators to Compare Equity Policies*. Dordrecht:Kluwer Academic Publishers.

in constructing an overview of the available evidence, and to identify which influences the evidence shows to make a bigger difference for all our learners.

An earlier literature review³¹ commissioned by the Ministry of Education indicated that about 40 to 65 percent of variance in outcomes is attributable to the influences of family and communities, depending on the outcome of focus. An analysis³² of the multi-level studies of school and teacher/class influences showed the impact on variance at the teacher/class level to be variously 16 percent to 60 percent of the variance in learner outcomes, depending on the subject area, level of schooling, and outcome of interest. The impact on outcomes of school level influences (from 0-20.9% of impact on variance) varied considerably depending, for example, on the length of time the learner had spent in the school, the subject area, the school's policy of allowing, or not, lower achievers to be assessed, and so on. But the school level impact was consistently far smaller than that at the teacher/class level.

This initial overview has provided a guide for a progressive series of iterative best evidence syntheses focused on the major influences on learning outcomes. The initial syntheses in the series³³ focus on the influences of families and communities³⁴, quality teaching^{35,36} and teacher professional development³⁷ on learner outcomes. The syntheses have been made accessible on the web (www.minedu.govt.nz/goto/bestevidencesynthesis) and available on request, occasioning high demand particularly from educators. While the initial focus has been on generating first iterations relating to family and community influences, and for the early childhood and schooling sectors, the programme is planning to extend to include the tertiary sector.

The Ministry of Education in partnership with the teacher unions and the principal associations, and in consultation with the New Zealand Teachers Council has commissioned four new BESs:

Teacher Professional Learning and Development (Schooling)-Dr Helen Timperley and Lorrae Ward;

Characteristics of pedagogical approaches that facilitate learning for diverse learners in early childhood and schooling in Pāngarau/Mathematics- Professor Glenda Anthony and Margaret Walshaw;

Characteristics of pedagogical approaches that facilitate learning for diverse learner in early childhood and schooling in Tikanga-ā-iwi/Social Studies/Social Sciences- Graeme Aitken and Claire Sinnema, and

Educational Leadership Professor Viviane Robinson and Associate Professor Michael Mintrom.

30 Odden, A. (1989). Making sense of education indicators: the missing ingredient. In T. Wyatt & A. Ruby. *Education indicators for quality, accountability and better practice: Papers from the National Conference on Indicators on Quality in Education*. Sydney: Australian conference of Directors-General of Education.

31 Nechyba, T McEwan, P., & Older-Aguilar, D. (1999). *The Impact of Family and Community Resources on Student Outcomes*. Strategic Research Initiative Literature Review. Wellington: Ministry of Education.

32 <http://www.minedu.govt.nz/index.cfm?layout=document&documentid=8679&indexid=1004&indexparentid=1072>

33 www.minedu.govt.nz/goto/bestevidencesynthesis/

34 Biddulph, F., Biddulph, J. & Biddulph, C. (2003). *The Complexity of Community and Family Influences on Children's Achievement in New Zealand: Best Evidence Synthesis*. Wellington: Ministry of Education.

35 Farquhar, S. (2003). *Quality Teaching Early Foundations: Best Evidence Synthesis*. Wellington: Ministry of Education.

36 Alton-Lee, A. (2003). *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington: Ministry of Education.

37 Mitchell, M. & Cubey, P. (2003). *Characteristics of Professional Development Linked to Enhanced Pedagogy and Children's Learning and Early Childhood Settings: Best Evidence Synthesis*. Wellington: Ministry of Education.

By partnership is meant that the stakeholder representatives engage with the *Guidelines for Generating a Best Evidence Synthesis*, assist with the development of Request for Proposals, join the cross-Ministry of Education tender selection team, and continue their roles as part of the contract management team meeting with the BES writers to discuss scoping issues, scrutinising and providing feedback upon the milestone reports, and helping to oversee the formative quality assurance of the BESs. The BESs also involve a range of secondary analyses focussed on relevant embedded information. For example: the role of centre-home/ school-home linkages, the role of ICT and other educational resources, and the role of educational leadership (across the BES reports) in mediating impacts on outcomes.

A three-year plan is being developed as a consultative tool within the Ministry of Education and for use with stakeholders to identify criteria for topic selection, foreshadow and provide a rationale for a programme of syntheses. The criteria for selection of new BES topics include: potential impact on diverse learner outcomes; strategic policy need in the light of education indicators and other evidence about system underperformance/performance; methodological viability, resource availability, the need for a strengthened knowledge base about education improvement and change processes, and balance and synergies across the system in knowledge building.

An Iterative BES Programme Contributing to Sustained Evidence-Based Progress in Education

Rather than defining Evidence-based Policy Research (EBPR) as a particular kind of research that is sufficiently rigorous to inform policy, the iterative best evidence synthesis approach identifies a sub-set of existing educational research and relevant research from other disciplines as having particular value, as a *body of evidence* for informing educational policy (and practice). That sub-set is research that provides credible evidence about influences on learner outcomes (the *what, under what conditions, why, and how*).

Beyond the one criterion that, to be included in an iterative BES, the research method must provide credible evidence about influences on learner outcomes, the iterative BES approach necessarily takes a pluralist approach to research design and method. There are good reasons for taking a rigorous pluralist approach. This view dates back to Aristotle's explanation that the methods of investigation need to be appropriate to the focus of inquiry:

It might be supposed that there was some single method of inquiry applicable to all objects whose essential nature we are endeavouring to ascertain... In that case what we would seek for would be this unique method. But if there is no such single and general method... Our task becomes still more difficult. In the case of each different subject we shall have to determine the appropriate process of investigation.

Aristotle, De Anima 1: 10³⁸

Given the complexity inherent in educational influences, there is a range of research designs and methods that can usefully illuminate different areas of focus such as teaching, initial and ongoing teacher education, educational leadership, resourcing, and the research and development endeavour itself. A synthesis approach is required that is able to interrogate and evaluate the validity, rigour and explanatory power of any particular study in relation to its adequacy to explain its phenomena of focus.

What counts as validity, rigour and explanatory power in educational and psychological research is deeply contested. For example, the United States Coalition for Evidence-based

38 McKeon, R. (Ed.). (1968). *The basic works of Aristotle*. New York: Random House. (pp. 145-146).

Policy³⁹ has made a strong case for randomised controlled experimental trials as the ‘gold-standard’ for the evidence-base. However, the hypothetico-deductive method that underpins this ‘gold standard’ has been critiqued for promoting the premature formulation of explanatory models, discouraging the exploratory analysis of data, failing to focus on theory development⁴⁰ and providing an inadequate account of theory confirmation (Haig, 2000⁴¹; 2003⁴²). Arguments have been advanced for the use of alternative statistical methods such as Bayesian statistics for the orderly revision of explanatory views⁴³. Research approaches such as longitudinal micro-genetic studies^{44,45,46,47} carried out in classrooms (not laboratories) that intensively trace learner experiences and changes over time provide an example of a rigorous alternative. Such studies optimise validity through multiple observational approaches (e.g. broadcast microphones, multiple videos and observers) and in-depth assessment of learning outcomes. Within micro-genetic method, prediction can offer a foundation for theoretical development and explanatory power about cause, and inter-related influences, even when those influences are not directly observable such as processes in the mind⁴⁸. The use of prediction within and across microgenetic studies can assist in identifying critical variables such as the role of working memory constraints in influencing instructional effectiveness. Microgenetic studies that focus on diverse learners simultaneously remind us that mean scores hide quite different learning experiences and outcomes for high and low achievers within ostensibly the ‘same’ teaching programme⁴⁹.

In summary, although there are good reasons for taking a pluralist approach, there is methodological contestation in outcomes-linked studies in educational research. The iterative BES approach is bringing together leading New Zealand educational research methodologists working from different perspectives to forge agreement about what counts as validity, rigour, explanatory coherence and power, adequacy and usefulness to inform policy and practice. The purpose is to generate and iteratively revise guidelines for New Zealand synthesis writers that can progressively strengthen the knowledge base.

A rigorous synthesis can offset the weaknesses and flaws inherent in particular research approaches through triangulating evidence from potentially complementary research designs and methods. As has been argued previously much outcomes-linked research in education has been carried out in a hypothetico-deductive style that fails to give sufficient weight to theory development. Explanatory theory is a vital tool for the ‘transportability’ of research-

39 Coalition for Evidence-Based Policy. (2003). *How to assess whether an educational intervention has been ‘proven effective’ in rigorous research: A user-friendly guide for the educational practitioner*. Washington DC.: The Council for Excellence in Government. www.excelgov.org/evidence

40 Gage, N.L. (1996). Confronting counsels of despair for the behavioural sciences. *Educational Researcher*, 25(3), 5-15.

41 Haig, B. (2000, August). Explaining the use of statistical methods. Comment. *American Psychologist*, 55, 962-963.

42 Haig, B. (2003). Exploratory factor analysis, abduction, and the principle of common cause. In H.J. Adler & G.J. Mellenbergs (Eds.), *Proceeding of the Second Workshop on Research Methodology* (pp. 237-246). Amsterdam: The Free University.

43 Haig, B. (1996). Statistical methods in education and psychology: A critical perspective. *Australian Journal of Education*, 40 (2), 190-219.

44 Nuthall, G. (2004). Relating classroom teaching to student learning: A critical analysis of why research has failed to bridge the theory-practice gap. *Harvard Educational Review*, 74 (3), 273-306.

45 Nuthall, G.A. (2000). The role of memory and the acquisition and retention of knowledge and science and social studies units, *Cognition & Instruction*, 18 (1), 83-139.

46 Nuthall, G.A.. & Alton-Lee, A.G. (1993). Predicting learning from student experience of teaching: A theory of student knowledge construction in classrooms. *American Educational Research Journal*. 30, 799-840.

47 Siegler, R.S., & Crowley, K. (1991). The microgenetic method: a direct means of studying cognitive development. *American Psychologist*, 46(6), 606-620.

48 Alton-Lee, A. G., & Nuthall, G.A. (1992). A generative methodology for classroom research. *Educational Philosophy and Theory: Special Issue Educational Research Methodology*, 24(2), 29-55.

49 Nuthall, G.A. (1999). Learning how to learn: the evolution of student minds through the social processes and culture of the classroom. *International Journal of Educational Research*, 31 (3), 139-256.

based development approaches from one setting to another. Educator/s or other agents need deep understanding to ensure that what is critical to the 'intervention' is not lost, while being appropriately adaptive to the learners and the new setting. Despite their flaws methods of research integration that do draw on hypothetico-deductive method and employ statistical procedures such as meta-analysis play an invaluable role in highlighting where more in-depth explanatory theory and case examples would be of most value for policy and practice.

Findings from international meta-analyses can help provide an indicative skeletal structure for an iterative BES, through revealing whether effect size across a range of experimental studies indicates that a variable of interest is linked to lower or higher mean achievement than would be predicted from 'business-as-usual' approaches, and signal importance through magnitude of effect. Co-operative task structures provide an example of an influence of particular interest from a policy perspective because they exemplify a teaching approach by which supports can be simultaneously intensified for high and low achievers to raise academic achievement and strengthen social outcomes. In an over-arching collation of six meta-analyses, Lipsey and Wilson (1993)⁵⁰ included consideration of three meta-analyses that found effect sizes of 0.62 (N=133 studies), 0.72 (N=122 studies) and 0.75 (N=98) showing particularly strong effects on achievement of effective co-operative group task structures. Three other meta-analyses identified by Lipsey and Wilson (1993) reported far smaller effect sizes for achievement effects of co-operative group approaches all falling short of the 'business-as-usual' cut-off at .40 argued by Hattie (1999)⁵¹. In-depth case studies of 'co-operative groupwork' in the New Zealand context have revealed displacement of intellectual task engagement with a social focus (Higgins, 1998⁵²). These findings of variability highlight the importance of research programmes such as those led by Cohen (1994)⁵³ that have inter-linked research and development, built on a strong empirically-tested theoretical foundation and included attention to the role of culture in education, to explain quite specifically the what, how, under what conditions and why of effective practice. Notwithstanding the strengths of Cohen's and others work at Stanford University with bilingual Spanish/English tasks, further research and development work is needed in the New Zealand context to illuminate the potential for an evaluated and evidence-based approach appropriate to our contexts.

The final point to make about a pluralist approach to research method is that it is vital to our shared goal of getting sustained progress in education. Policy makers and practitioners need a pluralist approach to the inclusion of research evidence in syntheses because of the kind of knowledges that are necessary to support sustained education system development. Educational change can be stimulated and supported by external interventions, regulatory conditions and other levers. Sustained evidence-based progress requires wide ownership of, and engagement in, cyclical patterns of evidence-based research and development cycles at multiple levels of a system. Taking an evidence-based approach to consideration of educational change activity, Coburn (2003)⁵⁴ argues for more attention to synthesising the evidence about the multidimensional issues of 'scaling up' to achieve better understandings about achieving lasting educational change. She calls for attention to the inter-related dimensions of depth (requiring stronger theorising of development) and to the importance of educator ownership in enabling spread and sustainability.

50 Lipsey, M. W., & Wilson, D.B. (1993). The efficacy of psychological, educational, and behavioral treatment: Confirmation from meta-analysis. *American Psychologist*, 48 (12), 1181-1209.

51 Hattie, J. (April, 1999). *Influences on student learning*. Inaugural lecture, University of Auckland, New Zealand.

52 Higgins, J. (1998). *Learning and teaching mathematics in the first two years at school: Groupwork, independence, and understanding*. Unpublished doctoral thesis, Victoria University. Wellington.

53 Cohen, E. (1994). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research*, 64 (1), 1-35.

54 Coburn, C.E. (2003). Thinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher*, 32, (6), 3-12.

Challenges of an Evidence-based Approach to Sustained Progress in Education

In this section of the paper, three examples of New Zealand research included in the iterative BES *Quality Teaching for Diverse Students in Schooling* are used to illustrate the claims made about the potential of synthesis to better inform policy and practice about what has made a much bigger difference for learners. The discussion in this section also foreshadows the kinds of questions that need to be better addressed about '*the importance of integrating understanding about what works in implementing what works*'⁵⁵.

Biddulph's (1983⁵⁶;1993⁵⁷) experimental study of a four-session (five hour in total) group programme to train New Zealand parents of children with reading difficulties to tutor their children at home, was relatively low cost. It produced reading gain increases across one to four reading levels that were significantly ($p < 0.001$) higher than those of a control group after three months and sustained a year later at an average level of progress for previously struggling readers. Both the target group and the control group received the business-as-usual in-school supports for learners with reading difficulties including individual assistance. Research and development were closely aligned in Biddulph's approach which was grounded in a strong theoretical foundation and the findings elaborated and explained through detailed case studies. The experimental design using random assignment of matched students within and across schools was quite feasible because the intervention occurred out of school time. This work illustrates a critical role afforded by research-based postgraduate study in education for supporting inter-linked research and development. Perhaps the strongest indication of the success of the intervention is that across two decades of word-of-mouth recommendations, it has occasioned from NZ educators, hundreds of requests for the originator to help others to implement the intervention⁵⁸.

Because this work was carried out as a masters research project by a full-time teacher adviser it did not, and normally would not, become embedded within a wider research literature in New Zealand. Through the iterative BES the significance of such work can be better understood, given the larger body of evidence, and embedded into a knowledge building process to more systematically inform policy and practice.

That the five-hour intervention is a time-effective strategy for such a substantial gain for very low achievers should be of interest to policy makers. A workshop facilitator's package has been developed to help support the wider use of this intervention⁵⁹. But the intervention is dependent upon expert knowledge and pedagogical expertise in the implementation of the programme. The first challenge for evidence-based policy is to build a sufficient knowledge base about what it would take to train other facilitators to be able to replicate, appropriately adapt and evaluate the approach, in working with parents and caregivers throughout NZ. The second challenge is to understand what it would take to embed such an approach into a sustainable progress model. These are new research and development tasks calling for evidence about effective facilitation of professional and adult learning linked in turn to student outcomes.

55 Nutley, S., Walter, I., & Davies, H. (2002). *From knowing to doing: a framework for understanding the evidence-into-practice agenda*. Discussion paper 1 St Andrews: Research Unit for Research Utilisation.

56 Biddulph J. (1983). *A group programme to train parents of children with reading difficulties to tutor their children at home*. Unpublished MA research report, Education Department, University of Canterbury.

57 Biddulph, J. (1993, May). *Teacher-parent partnership to support children's reading development*. Paper presented to the New Zealand Reading Association Annual Conference, Christchurch.

58 If you wish to follow-up further information is available at <http://www.readingtogether.net.nz/> info@thebiddulphgroup.net.nz

Jeanne Biddulph she can be contacted at jeanne.biddulph@paradise.net.nz

59 www.readingtogether.net.nz

Phillips, McNaughton and MacDonald (2001)⁶⁰ designed a research-based intervention to strengthen literacy development for the predominantly Māori and Pasifika learners from low socio-economic status families feeding from 37 early childhood centres into twelve schools. They used quasi-experimental evaluation design with cross-sectional and longitudinal features. The results across seven measures of achievement outcome found 5 out of 7 effect sizes for reading achievement exceeded Hattie's cut-off of .40. For those learners in the combined early childhood/ schooling intervention there was an effect size of 1.0 (i.e about a year's achievement difference from business-as-normal). These effect sizes were evident for the data over the twelve schools despite the intervention failing in two of the schools (which of itself provides potential insights about barriers to the implementation).

This research-based intervention used cultural mismatches between teaching approach and learner experience as a resource to improve teaching, suggesting deep and complex changes in the cultural and instructional practices of teachers. In the light of the extensive research literature documenting issues of cultural capital mismatch between school and home as a seemingly insuperable barrier, this interlinked research and development signals a potentially momentous leap in our understanding of pedagogical responsiveness to diverse learners. Much of what was critical to the success of this work is deeply understood by the researchers/teacher educators involved in the intervention but not easily transferable. The synthesis highlights the policy significance of this work as breaking a long-standing pattern of wide disparity in student achievement. But, the challenges of building on, sustaining and expanding this kind of deep change through the education system are formidable.

There is a growing focus on these critical 'transportability' and sustainability issues in other work commissioned by the Ministry of Education^{61,62, 63} and iterative BES processes are in place to synthesise understandings emerging from this work⁶⁴. To achieve sustained progress we need to understand that the issue of 'scaling up' is not just a matter of applying intervention logic. Rather it is a new research and development task requiring an evidence-base as substantial as that needed in the underlying evidence base about what works for learners in early childhood, classroom and tertiary settings.

The aim is to produce sustained, evidence-driven advances in the effectiveness of education. Formal education of itself is an intervention. A reductionist interventionist focus could, however, inadvertently narrow our goal of promoting the health of a whole system for all its learners, to one of fixing problems. An interventionist focus can also inadvertently promote a 'top-down' fixing model rather than a view of cyclical research and development that is dynamic, collaborative in practice, and pervasive within a continuous and sustainable improvement model. In such a model, high quality educator action research has a key role to play in exemplifying close inter-relationship between research and development that is responsive to specific contexts, and specific groups of diverse learners.

The third study used as an example here is an unpublished teacher action research study that would likely fail to be counted as sufficiently rigorous by criteria⁶⁵ for evaluating evidence-

60 Phillips, G., McNaughton, S., & MacDonald, S. (2001). *Picking up the pace: Effective literacy interventions for accelerated progress over the transition into decile 1 schools. Final report to the Ministry of Education on the Professional Development associated with the Early Childhood Primary Links via Literacy (ECPL) Project*. Auckland: The Child Literacy Foundation and the Woolf Fisher Research Centre.

61 Higgins, J. (2003). *An evaluation of the Advanced Numeracy Project, 2002*. Wellington: Ministry of Education.

62 Higgins, J., with Parsons, R., & Hyland, M. (2003). *The Numeracy Development Project: Policy to Practice. New Zealand Annual Review of Education 2002*. Wellington: Victoria University.

63 Timperley, H., Phillips, G., & Wiseman, J. (2002). *The sustainability of professional development in literacy*. Report prepared for the Ministry of Education by Auckland Uniservices. Wellington: Ministry of Education.

64 For example, Mitchell, M. & Cubey, P. (2003). *Characteristics of Professional Development Linked to Enhanced Pedagogy and Children's Learning and Early Childhood Settings: Best Evidence Synthesis*. Wellington: Ministry of Education.

65 Advanced by US participants in the OECD-US Seminar on Evidence-Based Policy held in Washington D.C. in April, 2004.

based research for policy (causality claim, explanation claim, transportability, stability, validity and variability). For example, the research role was complementary to the teacher's primary role as teacher, gain scores were compared with previous assessment results of the learners, the theorising of the intervention was emergent, the setting was one class, and so on. McNeight (1998)⁶⁶ introduced a school-home link for Samoan students within a senior secondary school classical studies class study of Roman religion, that led to her students' achievement levels more than doubling from what had been the pattern in previous units of work, dramatically countering a record of failed assessments.

The intervention involved students in a planned discussion with either a significant other at home or in the wider community. The focus of discussion was the associative links between what they were learning about ancient Rome and traditional Samoan culture. Each day the students would share what they had each learned. McNeight reported that the effects continued after the intervention, as family members would ask the students and teacher what they were learning next in classical studies. In effect the students' cultural heritages became a resource, and the students themselves the strategy to access that resource. Although on its own McNeight's study would not appear to be sufficiently rigorous to meet the proposed criteria, when considered in relation to the overall synthesis, this intervention exemplifies aspects of all ten key characteristics of quality teaching derived from the wider synthesis⁶⁷. In particular it utilises a similarities and difference metacognitive strategy that was found to have the most powerful impact on student achievement of any educational strategy in the meta-analyses carried out by Marzano, Pickering and Pollock (2001)⁶⁸. Because it is a case study situated in teaching practice it speaks to teachers. It has been reported by educators to be an example that has immediately inspired them to use, adapt and evaluate this strategy for Pasifika learners.

An iterative BES programme aims to provide a knowledge-building tool and process that can inform policy as it returns, and explains, accounts of effective practice to educators, and others with agency in education. The aim is to engage educators, researchers, teacher educators and leaders in a stronger shared and iterative evidence-based discourse about what works that of itself encourages an evidence-based approach to practice. It is a knowledge building tool that is seen to work alongside and inform a range of larger strategies (e.g. requirements for schools to use achievement data of learners in planning and reporting, embedding iterative findings from BES within self-review processes and accountability processes for schools).

The synthesis programme is an antidote to 'rediscovering the wheel' cultures and a tool, along with many others (including increased research funding⁶⁹), to strengthen and promote professional communities of inter-linked research and development. If it is successful then evidence of enhanced learner outcomes and enhanced equity will become evident in local and national trend indicators for academic and social outcomes. These claims about processes of system development themselves need to be subject to enlightenment through further syntheses that extend our understandings of what really does facilitate sustained progress in education. The examples given above illustrate the role iterative BES can take in informing policy development, in planning broader interventions, and as a catalyst for wider ownership to promote sustained improvement.

66 McNeight, C. (1998). "Wow! These sorts of things are similar to our culture!" *Becoming culturally inclusive within the senior secondary school curriculum*. Unpublished graduate research report, Wellington: Department of Teacher Education, Victoria University.

67 Alton-Lee, A. (2003). *Quality Teaching for Diverse Students in Schooling: Best Evidence Synthesis*. Wellington: Ministry of Education.
www.minedu.govt.nz/goto/bestevidencesynthesis

68 Marzano, R., Pickering, D., & Pollock, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Virginia: Association for Supervision and Curriculum Development.

69 An additional research fund was established by government to promote research on learning and teaching along with the establishment of the iterative Best Evidence Synthesis programme (*The Teaching and Learning Research Initiative*).

Forthcoming BESs will strengthen our access to the evidence about deep educational change and development processes. As we evaluate and critically reflect upon progress to date and the deepening knowledge about change processes, while drawing upon the iterative and collaborative processes that are integral to BES development and use, we are progressively able to use the BES series as a tool to strengthen educational policy and practice.

‘Quality Educational Research’ as Contribution to Research and Development

The bottom line in the Iterative BES Programme is that ‘quality’ research is research about improving practice. Quality research is research that helps make a substantial positive impact on desirable outcomes for diverse learners – that is: research and development that contributes to better educational practice and a better society.

Over the past 15 years in New Zealand, there have been remarkably few shifts showing national system improvements in achievement outcomes and almost none I can see that would be unexplained by major research and development. To me this indicates how critical educational research and development is in the project to strengthen educational practice.

Implicit in an evidence-based approach to development is the key role of R & D in system-wide development. But too often in the policy arena the key role of R& D is invisible as a lever for change. I suggest that we need to rethink both issues of quantum and integration of R & D in taking up the policy challenge around educational development.

A 2003 OECD report⁷⁰ identified the relatively low proportion of funding afforded to R& D in education generally and the challenges this raises for knowledge societies.

A rough estimate of the level of educational R & D as a percentage of total expenditure on education is on average less than 0.3% in six countries for which data are available. This is a very small figure when education is compared with other knowledge sectors, for example, the health sector where between 5-10% of the total health expenditure in public and private sectors are directed to R & D.’ (p.11).

The OECD Report includes an assessment of educational research in New Zealand and estimated educational research funding to be even lower than that for other OECD countries at between 0.17- 0.20%:

At the same time New Zealand invests far less in research and development of any kind than other developed countries, and has far lower R & D personnel per million population than Australia or Western European countries. New Zealand is successful educationally, but is, by R & D standards, not becoming a knowledge economy. (p. 89).

Since the OECD Review the New Zealand Teaching & Learning Research Initiative has been established providing \$2 million of government funding per year and requiring R & D partnerships between researchers and practitioners. This initiative has provided a knowledge building funding resource that is building the research base across a number of areas of shared researcher and sector concern but it is still a small step in the project to develop a sustainable, system-wide research and development agenda that will contribute to a high quality, high equity educational system.

⁷⁰ OECD (2003). *Knowledge management: New challenges for educational research*. Paris: OECD.

I conclude with some further challenges I see confronting researchers and policy makers in the collaborative endeavour of working with educators to strengthen a shared evidence-base that can make a bigger positive difference for education.

We have been attempting to reconnect teachers with the role teachers have played in developing a shared evidence base about effective practice. The research of interest is about their practice. Teachers should be able to take great pride in, and be able to share the complexity, brilliance, and setbacks inherent in the project of developing effective evidence-based practice. But teachers frequently see such evidence as the work of only researchers, not teachers, because so often the research is named only as the work of researchers. Is it ethical that research ethics protocols make teachers invisible in so many reported research studies of quality teaching practice?

An evidence-based approach requires systematically attending to what works and what does not work in order to progress. How can we create a learning environment within a democratic society, and within the profession, that supports learning from our experiences of what does and doesn't work at all levels of the system?

How can we get an increased focus on outcomes-linked evidence about effective teacher education, including initial teacher education, and policy development? How do we widen the lens on what works in education and become more systematically reflective in our thinking about wider-system development?

While some educational researchers are heroic in their commitment to working with the profession to make a bigger difference for all of our children, many educational researchers are not engaged with the challenge of improving practice. Is there a much greater role for researchers in contributing to evidence-based development in policy and practice? Is there a role for policy in creating the conditions to promote this?

If research and practice communities or policy and research communities become distant from each other, educational innovation may become less and less linked to tertiary infrastructure and R & D. What are the costs for R & D, knowledge creation and sustainable development in education when tertiary educationalists drop out of the loop? How do we develop infrastructure and interdependencies that keep R & D informing policy and at the heart of teacher education, research and educational practice?