

Enhancing the value and impact of research into vocational education and training: an Ako Aotearoa view

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Abstract

Vocational educators and trainers often bemoan the lack of research undertaken in their field and that policy and practice often lack a sound evidential base in New Zealand. However, Ako Aotearoa's National Register of Research and Implementation projects conducted on vocational education and training / workplace learning between 2006 and 2008 identifies around 120 separate pieces of work. One has to ask, therefore, why this very considerable effort has had so little apparent impact on practice. In this paper we explore why this might be the case.

Using Stokes' (1997) concept of Pasteur's Quadrant, we assessed a sample of 40 workplace learning research outputs on two dimensions: methodological integrity (as the key driver for extending fundamental understanding) and potential impact. We found that the majority of research (70%) was classified on the lower end of the range on both of these dimensions. Of the research classified more highly, most (25% of the total surveyed) scored well on both scales and was thus plotted in Pasteur's Quadrant.

It is our view, that if we are to enhance the overall value and impact of research on educational practice, Ako Aotearoa needs to foster improved methodological integrity of current work and encourage researchers to consider more comprehensively the applications for use.

Introduction

Between 2006 and 2008 there were 118 pieces of work recorded on Ako Aotearoa's National Register of Research and Implementation Projects as being undertaken on vocational education in New Zealand. However, as with other research in tertiary education, the impact on practice appears to be negligible. In this paper we set out to explore why this might be the case and how Ako Aotearoa as the National Centre for Tertiary Teaching Excellence might contribute to ensuring better synergies between research and practice in the future. We draw in particular on the issues and models of practice developed recently in the United Kingdom (UK) although similar issues have been raised elsewhere (e.g. The Department of Education Training and Youth Affairs, Higher Education Division, 2000 in Australia and Shavelson & Towne, 2002 in the United States).

In the mid-1990's there was considerable debate about the value to practice and policy of much educational research carried out in the UK (e.g. Hargreaves, 1996 and, particularly, the report undertaken for the Office for Standards in Education by Tooley & Darby, 1998). This debate became highly personal, acrimonious and politicised (*cf.* Baty, 1998), and still continues (Gill, 2009).

While much of the focus was on research in the compulsory sector, research in the post-compulsory sector was also included in this critique (Tooley & Darby, 1998). In

brief, key identified problems with much educational research included the following (Hargreaves, 1996; Hillage *et al.* 1998; Tooley and Darby 1998):

- Partisanship in the conduct and presentation of research
- Fragmentation of research and/or failure to replicate or build on other work
- Uncritical framing of research in the context of leading theorists
- Methodological problems such as sampling problems, particularly drawing wide generalisations from small samples or inadequate sampling techniques
- Lack of triangulation of empirical data
- Inaccessibility to policy makers and practitioners.

It was quickly recognised that the issues were more than just around the quality of work *per se*. There were funding and infrastructural drivers that allowed and encouraged these behaviours and reinforced a disconnect between research and practice. As a result, the Economic and Social Research Council established the Teaching and Learning Research Programme (TLRP) in 2000 which was explicitly designed to encourage high quality, use-inspired research and also to support the effective dissemination of results amongst policy makers and practitioners (Teaching and Learning Research Programme, 2009).

In particular, the TLRP looked to support research that sat within the upper right-hand section of a matrix measuring both contribution to fundamental understanding (seeking to push the boundaries of knowledge) and considerations of use (potential for practical application). Work in this quadrant - Stokes' (1997) "Pasteur's Quadrant" - scores highly on both these counts (Figure 1).

		<i>Considerations of use?</i>	
		No	Yes
<i>Quest for fundamental understanding?</i>	Yes	Pure basic research (Bohr)	Use-inspired basic research (Pasteur)
	No		Pure applied research (Edison)

Figure 1: Stokes' quadrant model of scientific research

Stokes' concept was originally developed in the context of the relationship between basic/applied science and development/production, which is traditionally seen as a linear relationship. Stokes argued that much science (and he cites Pasteur's work on vaccine development as the classic example) could be both use-inspired and basic at the same-time. It seems eminently reasonable for educational research to aspire to be in Pasteur's Quadrant, and the TLRP appears to have been successful in enhancing this (OECD., 2002; Rickinson, *et al.*, 2005).

In this matrix the work of Louis Pasteur is seen as being both pushing the boundaries of knowledge about disease and the body's immune system, but at the same time being focussed on curing the patient. Niels Bohr's work on atomic structure is cited as an example of ground-breaking work framed entirely in a theoretical context, while Edison's invention of the electric light was essentially the solution of a technical problem achieved by bringing together a range of existing theoretical understandings.

The inference of applying this approach in an educational context is that much current research may be either too theoretical to have relevance to improving practice or is of insufficient scope or rigour to push the boundaries of understanding beyond an immediate application. Of course, as Hammersley (2001) and Rees *et al.* (2007) have pointed out, this makes several challengeable assumptions about the nature of research and professional expertise within education.

Note that we are not saying that work falling into either the top left or bottom right quadrants of Stokes' matrix has no value: for instance original work that has a highly theoretical focus may have considerable impact on how academics frame an issue in the future. However, as a funding agency with limited resources, it is reasonable to assume that Ako Aotearoa should favour proposals for work that seek to address both application and an increase in fundamental understanding. If, in the worse case scenario, work does not meet either aspiration it must be of limited value from any perspective and we should question its fitness for purpose. Again, it is important to emphasise that the value and impact of any work will be dependent on both the researchers approach and the context and funding pressures under which they work.

The New Zealand Context

The Ako Aotearoa National Register of Research and Implementation Projects identifies over 700 projects on tertiary education conducted in New Zealand between 2006 and 2008. It is Ako Aotearoa's belief that this body of work has, at best, limited impact on practice. Our overarching objective here is to assess the usefulness of New Zealand research into vocational education and consider whether one of the reasons for its lack of impact lies in the quality and focus of the work, as contested internationally. Previous attempts to rate the quality of educational research in New Zealand has resulted in a poor prognosis – with educational research having low academic impact compared to other disciplines (Smart, 2009).

Given the focus of this particular conference, however, we will focus only on workplace teaching and learning. We attempt here to assess the value and impact of New Zealand workplace teaching and learning research with a view to informing Ako Aotearoa's future strategies for supporting work in this area.

Methodology

Overarching Approach

We sought to review a sample of the 118 research projects on workplace learning listed in the Ako Aotearoa Research and Projects Register. This sample was reviewed with the intention of plotting the work onto Stokes' (1997) matrix, to explore the value and impact of recent workplace learning research conducted in New Zealand.

It became evident that core drivers could be identified for both the ‘*Quest for fundamental understanding*’ and ‘*Considerations of use*’ identified by Stokes (1997). These drivers, or dimensions as they will be referred to, are *Methodological Integrity* and *Potential Impact* respectively. In order to rate the research on each dimension, we developed some key indicators of each (Table 1), drawing heavily from work conducted internationally on the quality of educational research (Hillage *et al.*, 1998; Tooley & Darby, 1998).

This gave us the basis for assessing each piece of sampled work on a ten point scale across each of the two dimensions.

Table 1. *Indicators of the dimensions Methodological Integrity and Potential Impact*

Methodological Integrity	Potential Impact
Methodological approach <i>Such as sample size and representation of sample, whether primary citations were used, the extent of triangulation present, presence of replication, appropriateness of analytical approach.</i>	Including/considering practitioners <i>Such as engagement and/or consultation with practitioners, the presence of a researcher-practitioner model.</i>
Contribution to cumulative knowledge <i>Such as the extent to which the work contributes to existing knowledge, whether authors acknowledged previous work in the area.</i>	Creating synergies/relationships <i>Such as the extent the work encourages synergies/relationships with practitioners, whether the work was conducted by inter/intra disciplinary teams</i>
Non-partisan approach <i>Such as the extent to which a non-partisan approach was adopted, whether there was sufficient evidence for the claims/conclusions of the work, and whether alternative views and/or interpretation of findings were presented.</i>	Dissemination/accessibility <i>Such as the thoroughness of dissemination including the range of potential audiences, how interesting and accessible the work would be to practitioners, and whether the implications for practice were explicit.</i>

Clearly, this process involved us making interpretative judgements about the quality and impact of current research on workplace learning. We should stress, therefore, that the intention of this work was not to result in a definitive summative statement about the quality of workplace learning research in New Zealand, but instead to begin a discussion about the type of work being conducted in New Zealand, its focus and likely impact on practice.

We predicted that we would find similar results to those from the UK, that is, little of the current research would be categorised as use-inspired. Instead, we predicted that much of the research would be high on ‘quest for fundamental understanding’ but low on ‘considerations of use’, or *vice versa*.

Sample

Eighty-seven completed research projects listed on the Ako Aotearoa Register that were confirmed as being relevant to vocational education and had research outputs

available for reviewing. From these 87 available outputs¹, 40 were randomly selected for inclusion.

Two reviewers rated pieces of work on a scale from 1-10 on each dimension using the indicators as a guide. Each reviewer was randomly assigned half of the outputs to assess individually, but both reviewers commenced their analysis by reviewing 5 identical pieces of work. Raters discussed their scores for each of these five outputs until agreement on scores was reached. Over the span of the review process the ratings were periodically cross-checked and particular output ratings were discussed where appropriate, until agreement was reached.

Of the 40 outputs reviewed, roughly half (53%) were from the health sector² with the remaining articles from a range of other workplace learning sectors. Thirty percent involved quantitative analyses, 30% involved qualitative analyses, 27.5% were non-empirical³, and 12.5% used a mixed method approach. Half of the articles were published in international peer reviewed journals, 10% in New Zealand peer-reviewed journals and 40% were published in non-peer reviewed journals or were other types of research (e.g. commissioned projects). These proportions broadly reflect the nature of the body of work available in the Ako Aotearoa Register on workplace learning.

Results

Using the two dimensional scores, each research output was plotted onto the matrix. Figure 2 shows that the majority of research (70%) was ranked as low on both methodological integrity and potential impact; there was a strong positive correlation between scores $r = .77$, $p < .001$. Thus our expectation that research might be high on methodological integrity and low on potential impact or *vice versa*, was not supported.

Given that half of the research outputs were in health disciplines, we compared whether health sector research differed to that of workplace learning in other contexts in terms of their plots on the matrix. As shown in Figure 3, roughly similar patterns of placement on the matrix were evident between health and non-health workplace learning.

¹ Thirteen projects were omitted from the selection as, on review, they were not considered directly relevant to the discipline of workplace learning; 3 theses were also omitted, leaving 71 projects available for selection.

² This was representative of the proportion of Health to other disciplines of all workplace learning projects.

³ Research was categorised as non-empirical when no primary data were collected (e.g. literature reviews and theoretical articles).

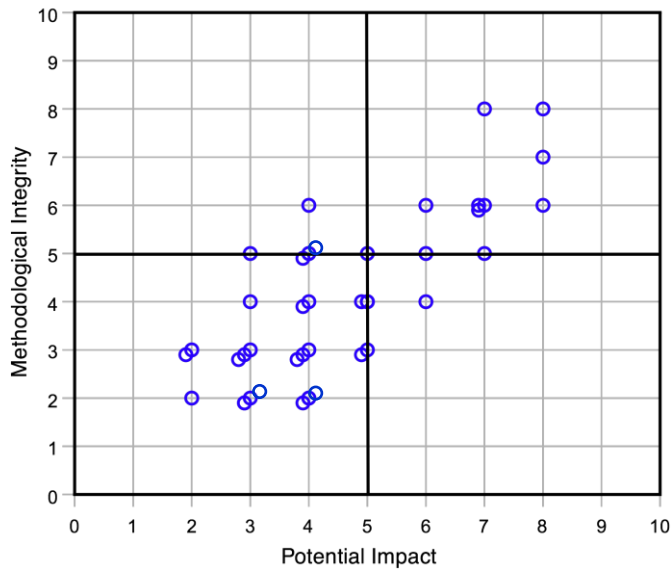


Figure 2: Plot of sample outputs on the methodological integrity / potential impact matrix

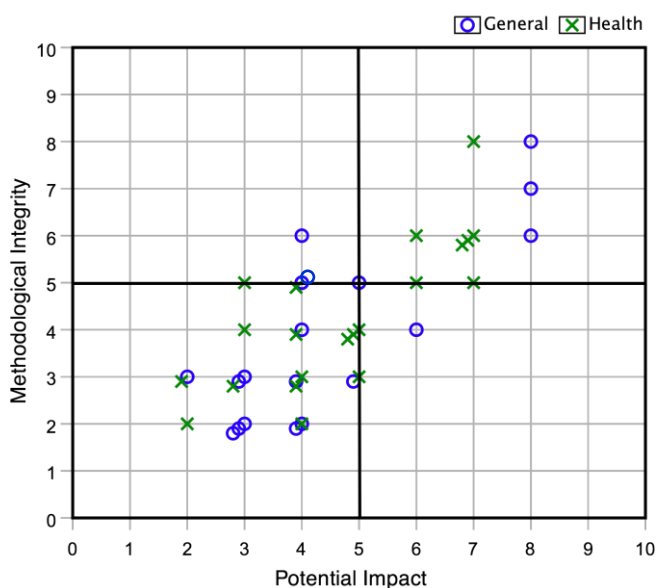


Figure 3: Plot of health and non-health (general) workplace learning outputs on the methodological integrity / potential impact matrix

Next, we explored whether the quality of research differed depending on the type of publication. Results (Figure 4) showed that research published in New Zealand peer-reviewed journals tended to score low on both methodological integrity and potential impact, whereas other types of publications tended to be spread more broadly across the quadrants. We would emphasise that we need to do further work on this before drawing any conclusions.

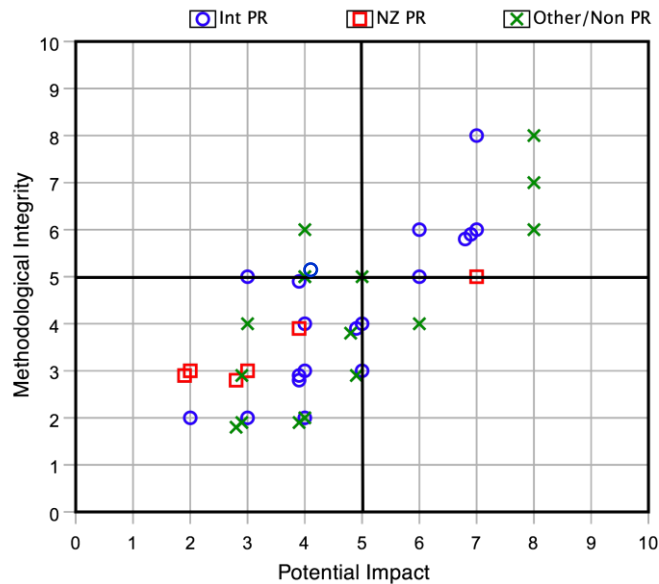


Figure 4: Plot of outputs on the methodological integrity / potential impact matrix by type of publication

Discussion

The majority of research sampled here was rated as exhibiting low methodological integrity and low potential to impact on practice. The percentage of low quality work (70%) is comparable to previously reported levels (63%) internationally (Tooley & Darby, 1998). This finding prompts us to ask two questions:

- what are the key limitations of current work which has led to this classification, and
- how might the value and impact of research into workplace learning be enhanced?

Limitations of sampled research

Unlike findings from the UK, the research sampled here was not predominantly qualitative. However, although both quantitative and qualitative methods were used, they were often used in isolation from each other: only 12.5% of the sampled research used mixed methods approaches. With regards to the qualitative work, there was often an absence of reference to the theoretical underpinnings of the work and a lack of explicit mention of the analytical framework used.

Quantitative studies tended to use small sample sizes and did not follow good-practice statistical conventions, e.g. effect sizes were seldom reported. In addition, the outcome / dependent variable measured in much quantitative research was seldom the intended learning outcome. For example, quantitative research tended not to measure the learning outcomes either directly or through learner self-report.

The outputs of the research sampled were also targeted almost exclusively to the academic community, for example a substantial proportion of outputs were peer-reviewed publications. The academic community is a critical audience of educational research and this focus is not in itself a problem. The problem lies rather in the

exclusivity of this focus. For research to impact upon practice, the outputs of research need to be accessible, interesting and relevant to practitioners.

It is difficult to avoid the conclusion that pressures of the Performance-Based Research Fund incentivise many researchers to seek peer-reviewed publications to the exclusion of other dissemination mechanisms.

How might the quality and impact of workplace learning be enhanced?

How might we enhance the methodological integrity of educational research in New Zealand? In our view, one of the key areas relates to the focus of the research. By focus we mean the overarching purpose of the work, and the extent to which the research questions and methodology adopted can contribute to this purpose.

One means through which to improve the overall quality of educational research is to improve the focus of the research questions themselves. Research questions should be framed to fill current gaps in knowledge, and should build upon what is already known in educational research. Research questions should also directly inform the research method and analytical approach adopted by the researchers.

Our impression is that some decision making by researchers in terms of method and analytical approach used may be informed more by their preferred methods than by the research questions themselves. In general we found an absence of triangulation of data in many low-scoring pieces of work. Ideally, researchers should have expertise in both qualitative and quantitative approaches and apply various methods depending on the research question posed. Acknowledging the difficulty in developing broad expertise in research capability (Findsen, *et al.*, 2001), collaboration is likely to provide some of the answer to this.

It is notable that 25% of research sampled does meet the criteria of Pasteur's quadrant. We contend, however, that this work's potential for impact has not been realised.

It should be acknowledged that the New Zealand Council of Education's Teaching and Learning Research Initiative adopts a researcher-practitioner model and has recently adapted their final reporting requirements to target multiple audiences (Baker, 2009). Ako Aotearoa through its project funding schemes also encourage project teams to consider the use and dissemination approach from the outset of a project, as well as develop outputs with considerations of use in mind.

In order for research to impact upon practice, there must also be an openness and preparedness on the part of practitioners to practice research-based teaching. This is part of a wider aspiration that tertiary teaching practice becomes increasingly evidence based.

Unfortunately various barriers to the development of this culture exist, including a reliance on the part of educators on experience and beliefs as well as a perception that the heterogeneity among learners prevents the development of general teaching principles (Hattie, 2009). Government policy also tends to focus on issues surrounding structure and resource rather than teaching and learning (Hattie, 2009), furthermore, it has been argued that the heavy reliance on government funding for educational research has politicised and restricted the work conducted (O'Neill, 2004). Although Hattie and O'Neill both predominantly draw upon the compulsory sector in making these assertions, we believe that such barriers exist in the tertiary

sector also (*cf.* Fullan and Scott, 2009) and thus Ako Aotearoa seeks to advocate for, and support the increasing valuing and influence of high quality educational research into tertiary teaching and learning.

What role can Ako Aotearoa play?

Last year was the inaugural year of the National Project Fund, which seeks to support use-inspired research and implementation projects in tertiary education. We allocated over \$1.3million to such projects and will continue to fund use-inspired projects on an annual basis. The selection panels for the National Project Fund are asked to select projects on the basis that the proposed work will both contribute to our basic understanding of tertiary teaching and learning *as well as* impact upon practice, and we are confident that the funded projects during 2008 have the potential to produce outputs that rate favourably in terms of Pasteur's Quadrant.

In addition to providing funding for strategic projects, we aim to support the promotion and dissemination of both work we fund, but also educational research more generally. For example, our newly developed website hosts project spaces where project teams can promote their work while the project is in progress and disseminate outputs to interested audiences. We also endeavour to contribute to developing a more coherent body of knowledge about tertiary teaching and learning in New Zealand, from which research can build.

More than this, we see our role as the National Centre for Tertiary Teaching Excellence as one of advocating for and supporting the enhancement of a culture among tertiary organisations whereby teaching and learning is placed firmly in the centre of strategic planning, where teaching becomes more uniformly influenced by high quality educational research that is easily accessible and interesting to practitioners and ultimately of benefit to learners.

Limitations of this study

Our objective of this work was to provide some initial data to inform a discussion about the value and impact of vocational educational research in New Zealand. We sampled a relatively small number of outputs from one specific area of educational research and although we develop some predictions from this initial data, wider generalisations of the findings presented here should not be made. As with any exercise such as this, the judgements made by Ako Aotearoa are subjective.

Furthermore, the premise of this work is based in the assumption that research does not drive change in practice, *cf.* Hattie's (2009) observations on the low effect of research on practice in the compulsory sector. While we believe this perspective is the quiet consensus in New Zealand for tertiary education, this view itself may be contestable in some areas of activity.

Finally, we have treated methodological integrity and potential impact as two independent dimensions however, a question remains as to whether the two dimensions are best characterised in this way. Our interpretation would be that the potential impact of work is limited by low methodological integrity.

Final Remarks

It is our view, that to enhance the overall value and impact of research onto educational practice we must enhance both the methodological integrity of current work and consider more comprehensively the applications for use. Although we focused on workplace learning here, we believe the problems identified span the breadth of research in education more generally, and we are already extending this work by reviewing a more general sample of educational research. We are confident that educational research in New Zealand can significantly improve its value and impact on practice and we want to support this improvement as much as possible.

We acknowledge too that the problems needs to be addressed at both ends: even the best, use-inspired research will have little impact if practitioners don't know about it or, knowing about it, are not incentivised and supported to change their practice.

References

- Baker, R. (2009, 27 February). Application and evolution. *New Zealand Education Review*, 14.
- Baty, P. (1998, 27 November). Dross, second rate, gobbledegook. *Times Higher Education*. London: TSL Education Limited. Retrieved 27 January, 2009, from <http://www.timeshighereducation.co.uk/story.asp?storyCode=110090§ioncode=26>
- Department of Education Training and Youth Affairs. Higher Education Division (2000). *The impact of educational research*. Canberra: Dept. of Education, Training & Youth Affairs.
- Findsen, B., Harker, R., Peddie, R., MacDonald, C., & Waitere-Ang, H. (2001). *Mapping the building of capacity and capability within the educational research community: Report to the Ministry of Education*. Wellington, N.Z.: Ministry of Education, Research Division; Auckland Uniservices.
- Fullan, M. and Scott, G. (2009) *Turnaround leadership for higher education*. San Francisco: Jossey-Bass.
- Gill, J. (2009, 8 January). Practise what you preach. *Times Higher Education*. London: TSL Education Limited. Retrieved 22 January 2009, from <http://www.timeshighereducation.co.uk/story.asp?storycode=404897>
- Hammersley, M. (2001). *Some questions about evidence-based practice in education*. Paper presented at the Annual conference of the British Educational Research Association, University of Leeds, England. Retrieved 21 February 2009, from <http://www.leeds.ac.uk/educol/documents/00001819.htm>
- Hargreaves, D. H. (1996). *Teaching as a research-based profession: Possibilities and prospects, The Teacher Training Agency annual lecture*: Teacher Training Agency.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London ; New York: Routledge.
- Hillage, J., Pearson, R., Anderson, A., Tamkin, P., & Institute for Employment Studies. (1998). *Excellence in research on schools* (No. RR74). Nottingham, UK.: Department for Education and Employment.
- O'Neill, J. (2004). *Airbrushing educational research for other agendas*. Paper presented at the Quality Public Education Coalition Annual General Meeting, Auckland.
- OECD. (2002). Educational research and development in England: Examiners report. *European Educational Research Journal*, 1(4), 705-738.
- Rees, G., Baron, S., Boyask, R., & Taylor, C. (2007). Research-capacity building, professional learning and the social practices of educational research. *British Educational Research Journal*, 33(5), 761 - 779.
- Rickinson, M., Walker, M., & Rudd, P. (2005). *Mid-term review of the ESRC's teaching and learning research programme - Final report*. Slough, UK.: National Foundation for Educational Research.
- Shavelson, R. J., & Towne, L. (2002). *Scientific research in education*. Washington, DC: National Academy Press.
- Smart, W. (2009). *Making an impact*. Wellington: Tertiary Sector Performance Analysis and Reporting, Strategy and System Performance, Ministry of Education.
- Stokes, D. E. (1997). *Pasteur's quadrant: Basic science and technological innovation*. Washington, D.C.: Brookings Institution Press.
- Teaching and Learning Research Programme (2009). *Aims*. London: The Institute of Education University of London, Teaching and Learning Research Programme, Economic and Social Research Council. Retrieved 1 April, 2009, from <http://www.tlrp.org/aims/index.html>
- Paper presented at the NZ Vocational Education and Training Research Forum, April 2009

Tooley, J., & Darby, D. (1998). *Educational research: A critique (the Tooley report). A survey of published educational research, paper presented to OFSTED.* Newcastle: University of Newcastle.