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April 2000

I am writing to try to clarify the rules of the game for the RAE in Education. There seems to be a conflict between the admirable general RAE principles and the more specific guidance on Education. This is distorting the pattern of innovative academic work in schools of education in ways that seem incompatible with the innovative skills of many fine academics, the needs of the education system, and with Government policy.

I write as one of the Directors of MARS, an international research and development team, which has bases in this country at Nottingham and Durham Universities. We are funded by, among others, the US National Science Foundation and QCA. The work is well-regarded and influential, and seems to fit the RAE definition of 'research' (the bold bits below). However, there is a general view that such work is 'not RAE returnable' (except as contributions to the community) – even that only papers in refereed academic journals 'really count' as research. Of course, this is partly the old conflict between pure and applied research. Your general principles suggest that both are to be equally valued in the RAE, but the Education notes do not. (The attached paper gives a more detailed analysis).

We in the Shell Centre MARS team are nearly all 'Type C' people, so perhaps it doesn't matter much to us personally. However it seems undesirable, from both a system and an educational policy point of view, to see such integrated R&D discouraged as less valuable than pure research papers. The question thus seems worth pursuing on policy grounds. For that reason, I am copying this letter and the attached paper to Michael Barber and David Blunkett.

I should appreciate your guidance. Should I be advising my colleagues to avoid the demanding work of developing tools that improve system performance, using research results as well as imaginative design as input, and research methods in development to ensure that they are indeed "new and improved"? Will they, ironically, get major RAE credit for evaluating but not for developing the tools? Is the academic paper really the only fully valid currency here?

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'**Research' for the purposes of the RAE** is to be understood as original investigation undertaken in order to gain knowledge and understanding. It **includes work of direct relevance to the needs of** commerce and industry, as well as to **the public and voluntary sectors**; scholarship; **the invention and generation of ideas and,** images, performances and **artifacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved** materials, devices, **products and processes, including design and construction.**

The RAE in Education: Is applied research second class?

Hugh Burkhardt[1] and others

This paper sets out some issues of concern about the criteria for the upcoming RAE in Education. It is stimulated by:

A an apparent conflict between the stated principles of the RAE, and the proposed practice for Education (UoA 68);

B the observed effects on the balance of work within schools of education, which seem in conflict with both the needs of the education system, and with Government policy;

C a need for further guidance, explicit or implicit, as to what is 'RAE returnable' as research in Education

It addresses educational research from a practically-focused 'engineering' point of view, where the primary research goal is improving system performance. This has a different, complementary emphasis from a more conventional 'science' approach to research, where the prime goal is insight, rather than practical impact. Of course, such scientific research is an essential element in good engineering; *it provides insights, identifies problems and suggests opportunities*. But it is not enough; *good research-based engineering is needed to develop effective solutions*. If well done, this is demanding, rigorous, takes time, and often needs teams; it is accepted in many other subjects. Further, in education there is no 'industry' that uses others' research in the systematic development of products (as there is for engineering and medicine, for example), so university work of this kind is even more important in education.

A. What is 'Research'? In the Guidance on Submissions RAE 2/99, para 1.12 gives a clear, broad definition of research:

> **'Research' for the purposes of the RAE** is to be understood as original investigation undertaken in order to gain knowledge and understanding.
>
> It **includes work of direct relevance to the needs of** commerce and industry, as well as to **the public and voluntary sectors**; scholarship; **the invention and generation of ideas and,** images, performances and **artifacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved** materials, devices, **products and processes, including design and construction.**
>
> It excludes routine testing and analysis of materials, components and processes, e.g. for the maintenance of national standards, as distinct from the development of new analytical techniques. *It also excludes the development of teaching materials that do not embody original research.*

The phrases highlighted (by us) in bold in this definition epitomise the kind of work with which we are concerned, including "the use of existing knowledge in experimental development to produce new or substantially improved ..... products and processes, including design and construction". This describes a kind of work that is of direct value in improving performance of the education system (and a focus of the government policy of "evidence-based practice" – "backing what works"). Further, the phrase "new or substantially improved" and the evidence

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Many people have contributed to this paper; the named author is responsible for the details and errors.

needed to show it, requires a systematic evidence-based approach to design and development that will surely encourage much-needed higher standards in such work. Such work is both creative and intellectually rigorous; encouraging it could be a major contribution of the RAE to Education. It is also extremely time-consuming.

However, in the Education section 3.59 of the RAE specification, the first substantive paragraph 3.59.2 reads:

> "The diversity of research in education, in content and in methodology, requires the panel to be flexible in marking the boundaries of work relevant to the RAE. For example, **curriculum, teaching and assessment materials may be included, but only where these are based on, or developed through research and have been published. The inclusion of such items should be justified explicitly in submissions in relation to the underlying research.** ***It is the quality of the research alone which will be assessed.*** The characteristics of quality that the Panel will use in making its judgments about research will include such features as originality, the contribution to the advancement of knowledge, methodological strength, scholarly rigour, and relevance to other researchers, policy makers or practitioners"

While much of the paragraph seems fine, the tone of the highlighted piece, and particularly the last sentence: "It is the quality of the research alone which will be assessed" seems at odds with the definition of research 1.12. There is no sense of "experimental development to produce new or substantially improved ..... products and processes, including design and construction" as being part of research; indeed, it sounds as those development aspects are to be explicitly excluded.

Of course, this is a question of interpretation. However, this reading is widely shared in schools of education. We would be delighted to be reassured that we had read 3.59.2 wrongly – that 'research' is indeed meant in the broad sense of 1.12 which includes innovative and rigorous development, with appropriate formative and summative feedback. If so, the sentence "It is the quality of the research alone which will be assessed." might better be replaced by, for example, "Evaluative evidence that the products are new or substantially improved will be an essential element in such submissions." This would be a positive RAE contribution to raising standards in development through research.

Finally, returning to 1.12, we would comment on the last sentence, which we italicised "*It also excludes the development of teaching materials that do not embody original research.* " It seems likely, made in the context of the whole RAE, to be concerned with materials for university teaching rather than tools for schools. Is this so? Here it again seems that, rather than embodying original research, the key criteria for recognising teaching materials as research should be "new or substantially improved" and "when used by others", as well as having an explicit research-aware design rationale.

B. The effects of the RAE Education criteria are important, in themselves and for their conflict with some of the other RAE principles in para 1.3, particularly :

> **1.3 f. Neutrality**: "The RAE exists to assess the quality of research in HEIs. It should carry out that function without distorting what it is measuring. In other words, the RAE should not encourage or discourage any particular type

of activity or behaviour, other than providing a general stimulus to the improvement of research quality overall."

In practice, the belief is that only articles in peer-refereed academic journals have significant value as 'research' in the RAE seems to many (apparently including the Secretary of State) to be producing highly undesirable distortions of the pattern of work of many creative academics. This provides the second reason to question the situation, both in RAE terms and on general policy grounds.

We believe that 'Neutrality' in assessment, though a nice idea, is unachievable. (We coined the acronym WYTIWYG – What You Test Is What You Get, which is now widely accepted and used as a policy instrument) Providing "a general stimulus to the improvement of research quality overall" involves value judgments as to what is research and what is quality. We believe that the 'backwash' effects on the behaviour of those assessed are a core responsibility that all assessment designers should explicitly accept. Unlike some, we think it is also an important opportunity to help raise standards.

What are these changes in the balance of research effort?

- For some people, who have an established pattern of traditional academic research reported through refereed journals, there are few changes or problems – though, because of the pressure on them and their colleagues, some worries.
- For a second group, including ourselves, with active programs of research (in the RAE sense of 1.12) more directly oriented towards improving practice, there is pressure to change their patterns of working. The dilemma is:

  > Should I be advising my colleagues to avoid the demanding work of developing tools that improve system performance? Is development, using research results as well as imaginative design as input and research methods in development to ensure that they are indeed "new and improved", not to be recognised as 'research'?
  >
  > Will they, ironically, get major RAE credit for evaluating but not for developing such tools? If so, who will do the development?
  >
  > Is the academic paper really the only fully valid currency? Does the world really need a flood of them?

  People react to such pressure in a variety of ways. Some ignore it and trust their own informed judgment; it seems that they and their institutions will pay a price. Others yield and try to conform, often with indifferent results because the work does not match their innovative skills.
- There is a third group – people who have not had significant (in either sense) research activity on any definition. It is the proper goal of the RAE to recognize and accept this for some (by not 'returning' them) and to stimulate others into valuable research activity. It is a responsibility for the designers of the criteria to ask what kinds of activity should appropriately be encouraged, taking account of the background of those concerned.

In Education, most academic staff did not have any formal full-time research training or guided experience of the kind that scientists receive. (I had 2 years of PhD study and 3 years post-doctoral research in 2 countries before starting as a Lecturer in Mathematical Physics) During the corresponding stage of their careers, most future academics in education were acquiring the professional 'craft'

experience as teachers which forms the basis of their role as teacher educators. Some became involved in part-time research, mainly to develop their abilities as reflective, questioning practitioners and to gain a further qualification. For most, this leaves them far short of the skills, experience and attitudes of the professional researcher. (In no sense is good research in education easier than in other fields) What kinds of research can such people usefully be expected to do, and what RAE pressures will encourage and raise the quality of such work?

Comments on this are bound to be provisional. In my observation, the quality of the research is likely to be highest when it is directly linked to the practice in which they have experience, as teachers, heads, teacher trainers etc. The system-value of it is likely to be highest when its products are directly usable by practitioners they understand. The quality of such work depends on moving it beyond mere "illustrated, experience-based opinion" to face in a systematic way the difficult challenges of making it optimally useful to others, and collecting evidence that it is so. These include challenges of generalisation and communication, as well as of experience and design imagination. The potential value of such improvements in standards of educational R&D seems enormous.

However one may regard this view, it is hard to believe that producing academic papers is the most suitable, let alone the only valued, activity for this group – yet that is what so many of them feel driven to do.

Those who designed the RAE criteria are responsible for its effects. Neutrality is an illusion. Are the current effects, which many have observed, really what you want?

C. Is this valuable 'research'?

To bring these rather general discussion to life, we conclude by outlining an example of research output that seems:

- to fit the general definition of research in 1.12;
- to represent a valuable and valued direct contribution to system improvement;
- to include evidence that the products and processes are "new or substantially improved".

Since this work seems likely to be dismissed or disparaged under 3.59.2, it is seen as non-returnable. (For example, a star designer-developer with a world reputation is advised, for his own academic good, to stick to the evaluation. Others cannot get regular academic posts) Does the following example qualify as research for RAE purposes? If not, why not?

An example: Balanced Assessment in Mathematics is a series of 8 books of exemplar assessment tasks, illustrated with examples of student work and analysis, designed to support curriculum reform across the age range 8 to 18, primarily in the USA. The development was the work over five years of a team of about 10 designer-observers, working in classrooms to obtain the feedback to develop this tool and to revise each task. (When the methodology was explained to the US National Research Council's Panel on Assessment in the light of developments in Cognitive Science, the Chair remarked: "This *is* cognitive science") Insights were gained, but they are not the major focus or value of the work.

The books are published. Examples of the materials are available on the Web, along with evaluative feedback from the team, from users of the materials and others.

The key features are:

- the materials are the main product of the research, taking most of the effort;
- evaluation is at the core of the methodology but is a means to an end (new and improved products and outcomes) not the point of the exercise;
- the work requires a team of complementary talents (as in, for example, experimental particle physics, my science research field)
- academic journals are not the appropriate vehicle for publishing the work, as opposed to the occasional article about it.

If these claims are substantiated, will this, should this, be assessed in the RAE as high-quality research?

Background

Hugh Burkhardt is a Director of the MARS project (The Balanced Assessment team's Mathematics Assessment Resource Service), with groups at Michigan State University, UC Berkeley and in the Shell Centre team at Nottingham and Durham Universities. MARS work is funded by the US National Science Foundation, the UK Qualifications and Curriculum Authority and other agencies. Professor Burkhardt's scientific research is in applied mathematics and theoretical elementary particle physics. A 'pure'scientist, he takes an 'engineering approach' to educational research and development, which has been the main focus of his work since 1976, when he was appointed Director of the Shell Centre for Mathematical Education at the University of Nottingham. He is Chair of the recently formed International Society for Design and Development in Education.