

Re-engineering research, teaching and learning with digital technologies: *how AAOU members might collaborate for the benefit of teachers and learners in their societies*

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Abstract

If universities are to be relevant in today's digitally connected world, ways of working which may have been established centuries ago urgently need to be reviewed and new practices adopted. This is a challenge not just for Asian countries but for all countries. The OECD challenge to school-based educators to update ways of working in the following quote is just as relevant to university-based educators:

"In modern knowledge-based economies, where the demand for high-level skills will continue to grow substantially, the task in many countries is to transform traditional models of schooling, which have been effective at distinguishing those who are more academically talented from those who are less so, into customised learning systems that identify and develop the talents of all students.

This will require the creation of "knowledge-rich", evidence-based education systems, in which school leaders and teachers act as a professional community with the authority to act, the necessary information to do so wisely, and the access to effective support systems to assist them in implementing change." OECD 2009, p.13

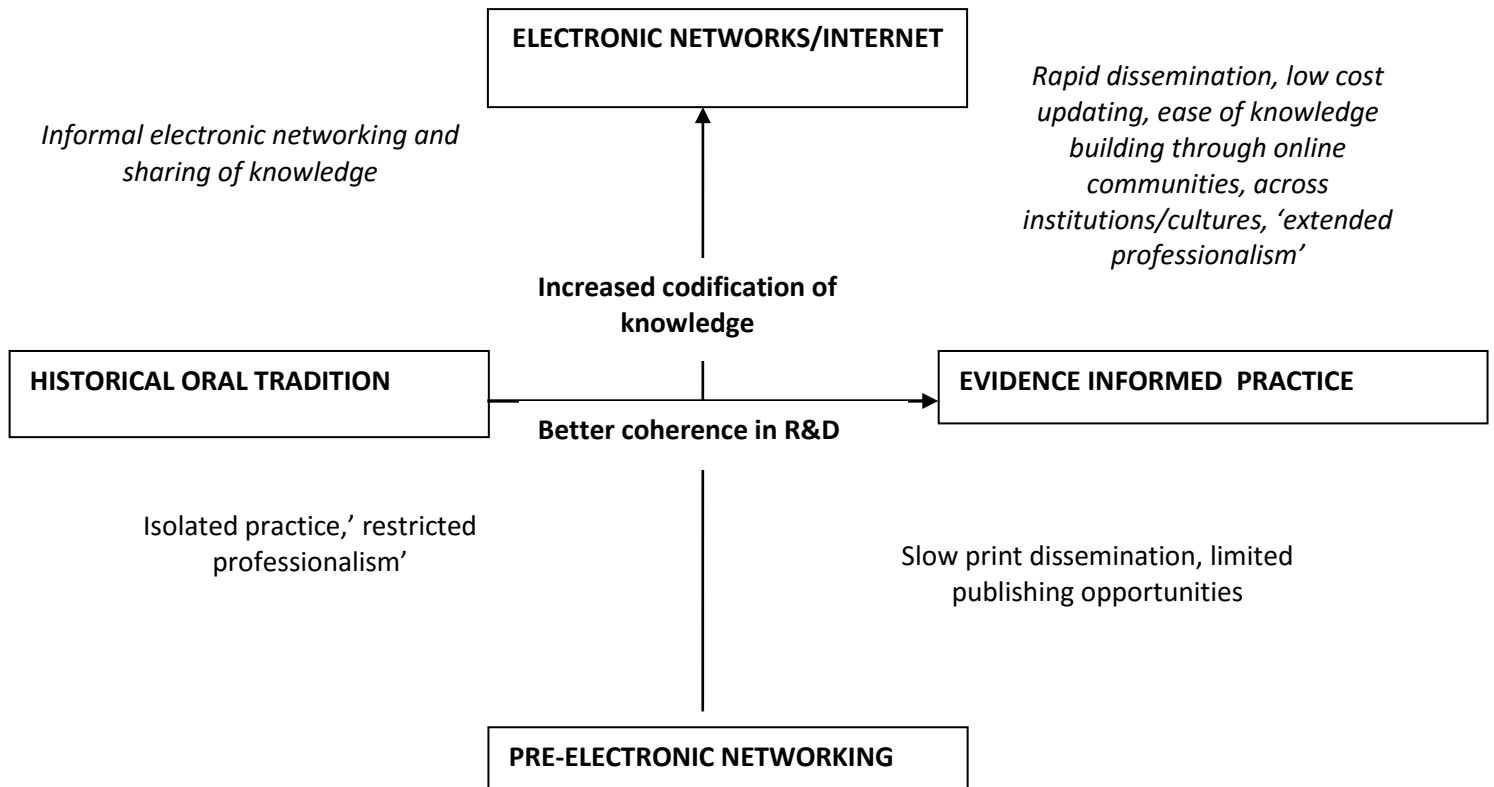
This paper outlines examples of new and emerging practices from a range of disciplines and challenges academics and university managers to be proactive in adopting new ways of working so that the contribution of universities to the national good is clearly demonstrated. Those who are reactive and wait for change to be forced upon them run the risk of being found to be irrelevant by governments and by potential clients – research users, practitioners in every discipline and students. The focus of this paper is particularly on new opportunities for collaboration, for collaborative research and new forms of publishing and how new forms of accountability may be necessary to value and encourage collaboration. Questions are posed to facilitate the development of new ideas around the themes which are the focus of the AAOU conference.

Introduction – why re-engineer teaching, learning and research?

Digital technologies have brought unimaginable opportunities to the education sector: see for example, the opportunity for the provision of low cost, high quality online teaching which some institutions are realising through experiments with MOOCs Massive Open Online Courses (<http://www.moocs.co/>).

Figure 1 illustrates the change in opportunities for researchers - from the 19th century situation where the academic was isolated and publication was slow to the 21st century scenario where digital technologies enable low cost international collaboration, rapid publishing, online communities of practice and easy access to what has been published.

Figure 1 Moving from 19th to 21st C professional practice (from Leask, 2011)



Imagine – what is your vision?

Imagine you were inventing an education system now, from scratch with the digital technologies available now at your disposal and with knowledge of the latest research from neuroscientists on learning i.e. that contrary to common beliefs, ability is not fixed because the brain remains ‘plastic’ through life so individuals have lifelong capacity to learn (OECD forthcoming 2014). What would you do to create the ‘knowledge-rich’ ‘evidence-informed’ system that the OECD highlighted above?

Q: What would be the experience of learners, research users, teachers and researchers be in such a system?

From the learner’s point of view, might your system provide lifelong educational opportunities (short courses, long courses, paid for and free- depending on resources and priorities) for old and young, accessible through a mobile phone as a minimum?

For research users i.e. policy makers and practitioners as well as other academics in every discipline, might your system provide them with access to high quality research– again accessible via a mobile device which could be carried to field locations (schools, clinics, homes, construction sites and other research sites) to inform their professional decision making. Would such research advice be regularly updated and would the limitations of the research and conflicting research findings be acknowledged to enable research-users to make research-informed decisions? Would your system support rapid response systems to policy and practice challenges through researcher networks which pool available expertise?

For teachers (in all parts of the sector), might their role be rather than delivers of knowledge one of collators of knowledge and constructors of rich learning experiences personalised to the needs of the learners and the context in which they find themselves? Such a role would require a clinical approach to teaching with the teacher able to diagnose problems learners face and able to construct pedagogical interventions to help learners overcome their barriers to learning.

For researchers, might such a system link researchers worldwide who wish to research on the same areas so that their joint effort is greater than the sum of the parts? Might it allow rapid publication of research and rapid updating so that the knowledge base in an area accumulates and is strengthened?

Most of this paper focuses on the opportunities to re-engineer research because while opportunities to re-engineer teaching are well developed, the re-engineering of research is lagging behind for a number of reasons including issues around the purpose of research, who, if anyone, has the right to direct and assess the research undertaken by academics.

Autonomy versus Accountability - Changes In the Role of the University and the Academic

Should academics be able to demonstrate that their research has impact? The Vice chancellor of the Canadian Simon Fraser University in 2004 to a university audience in Indonesia identified this as an international issue:

...in all universities around the world we are all dealing with very important issues of how to strike the proper balance between universities and governments, how to strike the proper balance between the autonomy of universities and the reasonable accountability of universities for the public funds that sustain much of their activity. (Stevenson, 2004: 1).

In England, the government agency responsible for universities (HEFCE, 2011) identifies five core strategic aims for its work with universities: improving the quality of teaching, widening participation, employer engagement and knowledge transfer, research and contribution to the economy.

In Australia, universities were required to sign three year 'mission-based' compacts with government with goals not dissimilar to those identified in England by HEFCE above (Australian Government, 2011b: 2).

In the US, the picture appears to be different with university engagement in national agendas around the knowledge economy appearing to be voluntary presumably because of the independence of the university sector from Federal Government control (US Government, 2010).

These demands for increased accountability of universities and academics are occurring at a time when new communications technologies mean that the outputs of academics' work can be easily and cheaply found and assessed by practitioners and policy makers, by potential users and funders. Questions are raised about practitioners' access to research, the small scale nature of much social science research undertaken by academics and forms of publication which mean research cannot easily be built on (BERA, 2000; TDA, 2004a; 2004b).

New expectations and ways of working are emerging around knowledge management and knowledge mobilisation (University of Toronto 2011, Oakley, 2003; MacGregor, *et al.*, 2006). These include expectations that policy and practice should be research and evidence based (OECD 2003; 2007a; 2007b), that systematic review systems should be developed to enable access to existing knowledge (EPPI-Centre¹; Campbell Collaboration²; Cochrane Collaboration³; Davies, *et al.*, 2000; GTCE, 2006; TDA, 2004a; 2004b; Leask and White, 2004) and that user engagement at all stages of research is possible in ways heretofore not possible.

Practitioners' Access to Research and Engagement of Practitioners in Research

In many areas of knowledge there is a large body of practitioners on whose practice research might potentially impact health, policing, the hundreds of functions of local government, these include social work and education. In the UK alone, there are over two million practitioners in local government and education. Until access to the internet became widespread (around the year 2000), access by such practitioners to research was very restricted. Models of co-researching linking researchers and practitioners can potentially lead to more impactful research and higher quality findings (Leask and Preston, 2012).

¹ <http://eppi.ioe.ac.uk>

² <http://www.campbellcollaboration.org/>

³ <http://www.cochrane.org/>

Examples of digital technologies which support new forms of low cost but high quality research

A wide range of E-tools now allows researchers to undertake what is potentially high impact and highly relevant research with less resource. Cost effective collaborations between policy makers, practitioner researchers and academic researchers can be particularly supported through the use of a range of e-tools which can lead to rapid and timely impact on practice through e-data collection, analysis and dissemination techniques. Table 1 sets out some of these tools and the opportunities for researchers. Making the most of these opportunities requires researchers to change ways of working and requires those responsible for publications to raise standards expected with respect to the strength of research evidence underpinning a publication.

Table 1 E-research tools (adapted from Arthur et al, 2012, p.60)

E-tools and new ways of working facilitated by technology	Notes and details of application
E-Access to government datasets for longitudinal studies	The OECD datasets and World Bank datasets: http://data.worldbank.org/ as well as datasets for increasing numbers of countries are available online. The World Bank Data Catalog provides download access to over 8,000 indicators from World Bank data sets.
E-surveys, e.g. Bristol Online surveys (http://www.survey.bris.ac.uk/), Survey Monkey (http://www.surveymonkey.com)	E-questionnaires linked automatically with databases and professional association email lists allow collection of data from significant sample sizes (1,000 plus) and rapid dissemination of findings within hours. Low-cost longitudinal studies can be undertaken and annual repeat surveys on individual topics would be similarly cost-effective.
Mind-mapping software as a research tool for use with focus groups	The use of this software provides for a new intensive approach to the running of focus groups. See the PIMS approach (Leask and Preston, 2012).
E-access to research databases and efficient search mechanisms	Research databases can now be linked and be cross-searchable. The Discovery tool searches fifty databases within seconds. Literature searches and the gathering of copies of articles for literature reviews, which once would have taken researchers weeks if not months, now take minutes. E-collections of articles can also be archived for others to build on. Databases of theses such as the US based ProQuest database with 3 million entries, the UK British Library EThOS service and the New Zealand Educational Theses database provide access to detailed studies.
E-infrastructure which supports researcher networking, e.g. online communities of practice linking practitioners, policy-makers and researchers to share and build knowledge and to undertake research collaboratively	Provides cost-effective methods for: <ul style="list-style-type: none"> – collective knowledge building; – scaling up small-scale research; – e-dissemination; – users to contribute to decisions on topics; – users to be co-researchers. For example, http://www.educationcommunities.org – networking researchers to do research leading to efficiencies, distributed knowledge, collective knowledge building.
Rapid publication	Publication in forms easily usable by a range of users can be cost-effectively provided. Rapid and low cost forms of publication include through open-access websites such as the UK Durham University e-journal (http://www.oeri.org) which is not dependent on any commercial publisher.
Systematic reviews to build knowledge	Systematic review approaches are now influencing expectations of how literature reviews might be constructed and reported so that they can be

Rapid evidence assessments/reviews	<p>shared and built on. Guidelines for the writing of articles so that they can be included in systematic reviews can be found in the REPOSE guidelines: http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=759. Some academics are requiring students writing theses to adopt systematic review methods. See also the methods for Rapid Evidence Reviews. Rapid evidence assessments or rapid evidence reviews are also methods for synthesising research.</p> <p>Background: Electronic search tools which are becoming increasingly sophisticated reveal the plethora of small scale studies generated by academics. In the period 2002-2007 in the UK government funds were allocated to systematic reviews of evidence from research (Davies, <i>et al.</i>, 2000; GTCE, 2006, Hu, <i>et al.</i>, 2000). It was not unusual in some social science disciplines (TDA 2004a,b,c) for thousands of small scale studies to be identified and for any synthesis of this research to be problematic because of the lack of any basis for comparison (see education reviews in the EPPI-Centre⁴).</p> <p>The Campbell Collaboration⁵ has been established to undertake reviews in the social sciences and this is an initiative that staff may find it profitable to engage in. A model of success in this area of systematic reviews of evidence is the successful Cochrane Collaboration⁶ for medicine.</p>
Translational research practice	<p>The 'Translational Research' approach now adopted by some medical researchers takes research 'from bench top to bedside' i.e. theory to practice and this approach can be facilitated by online communities software which provides cost effective ways of engaging researchers and practitioners in co-researching and in dissemination and impact. Well established in medicine, the concept does not appear to be widely used in other disciplines. The Map of Medicine approach provides an example of how researchbasedknowledge can be made easily accessible to practitioners and otherresearchers (http://www.mapofmedicine.com/). The MESH Guides, www.MESHguides.org show how the approach is being adapted for education.</p>
Online Networking	<p>Building knowledge through professional 'communities of practice' was recognised before the internet as a key method for developing professional practice (Schon, 1987; Wenger, <i>et al.</i>, 2002; Wenger, 1998; Lave and Wenger, 1991). See Figures 4 and 5 below for examples from education.</p>
Virtual meetings	<p>Software such as WebEx, Blackboard Collaborate and Adobe Connect provide high quality systems for virtual meetings. These require some practice for efficient management and the meeting chair should be supported by someone who can help manage inputs from attendees and technical issues. Nevertheless, they enable collaboration to take place that heretofore would have been prohibitively expensive.</p>

⁴ <http://eppi.ioe.ac.uk>

⁵ <http://www.campbellcollaboration.org/>

⁶ <http://www.cochrane.org/>

New forms of publishing

Forms of publication too are changing. The traditional linear approach to publishing is challenged by various web based resources providing access to knowledge through flow charts such as the Map of Medicine Health Guides (Figure 2 below <http://healthguides.mapofmedicine.com/choices/map-open/index.htm>) and the Mapping Educational Specialist knowhow Guides (www.MESHguides.org). Figure 3 below.

Figure 2: An example of new forms of publishing: Map of Medicine Healthguides.

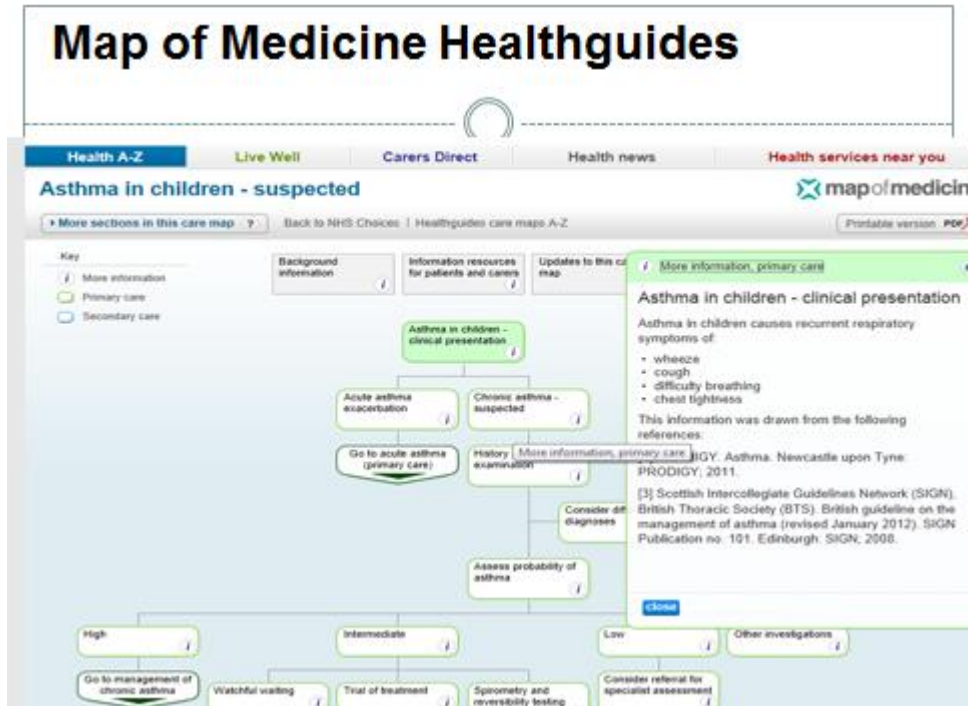
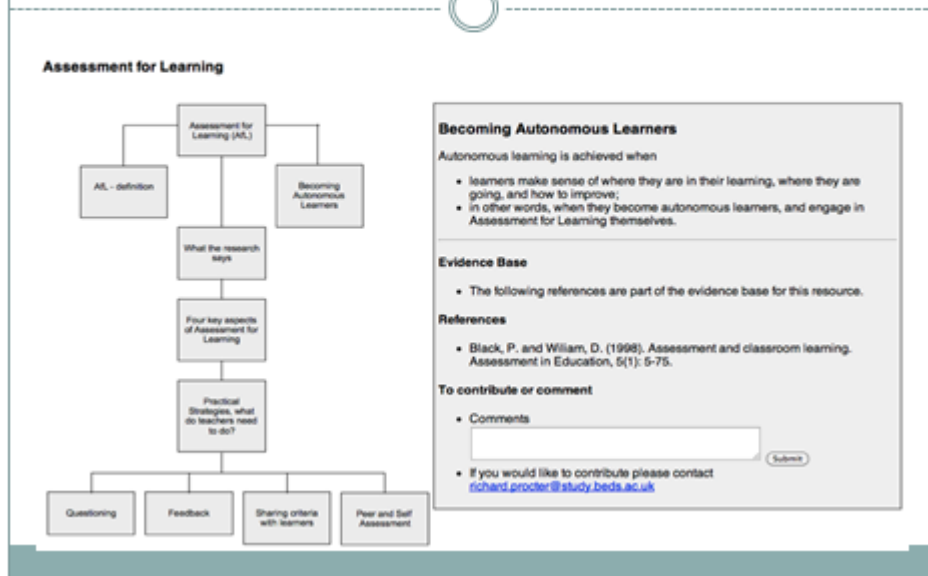


Figure 3 New forms of publishing – an example from WWW.MESHguides.org

Tool 1: MESH example

MESH
Mapping Educational Specialist knowHow



Academic accountability

Q: Who holds academics in your institution to account for the quality, impact, significance and reach of their research? Are these criteria it would be acceptable to apply in your context? If not why not? Would or do national research assessment systems damage or improve research productivity in your system? What are the implications for systems where academics are not held accountable? Should academics concern themselves with the application of their research to practice i.e. research impact?

In the sciences, team work resulting in publications from teams is common. By contrast, in social science related disciplines, the tradition of the lone researcher is not uncommon and indeed, publications which are 'sole authored' may be considered more prestigious by some than those that have multiple authors. This approach to research and publishing raises fundamental questions about the purposes of research and the purposes of publications in academic journals in the discipline. Close scrutiny and comparison of many articles published in academic journals indicate that while articles facilitate knowledge exchange between academics, they do not present research based findings relevant to the potential research users in the discipline. Sleeter (2013) for example, found that 1% of articles in the educational journals she examined had any relevance to pedagogy. It is hardly surprising therefore to find, as the OECD has, that educational practice is not based on research evidence.

The methods any country uses to hold academics and of universities to account for the value and quality of their contribution to the nation provide important levers for change (Leask in Arthur et al 2012). The UK, Australia and New Zealand appear to have rigorous systems of accountability of universities for their contribution to society which would be unacceptable in many other countries. The very notion of the state holding universities accountable is problematic in many countries where academic freedom from state interference is a valued notion. In these countries, it is argued that if the academic community does not develop and implement their own standards of accountability which make explicit the standards of teaching and research expected and the contribution a society can expect from universities, then calls for increased accountability from the state can be expected. Jumani and Leask (2011) highlight the limitations of traditional research methods and resulting publications which fall short of considering the implications for practice of the research.

Improving the quality, impact and significance of research

Q: Does the research produced by your institution yield results which can be considered significant nationally and internationally? What is practice now? How could this be improved? Are there processes in place which support the generation of research which has the potential for impact, reach and significance within existing resources?

Digital technologies can be used to enhance impact, reach and significance of research. These are the criteria which are being used to judge the quality of UK academic research in the 2014 UK national assessment of research excellence. Academics from other countries may find it instructive to compare practice in their own country with that elsewhere. See <http://www.ref.ac.uk/> . This research assessment process is not replicated in many countries but it is argued this approach brings a focus and purpose to academic work which has potential benefits for society at large and for the standing of universities. If one country is bringing such scrutiny to the research of academics then it is valuable for others to consider the advantages and disadvantages of such a system for learners, teachers, researchers, their disciplines and the nation generally and whether it is worth adopting positive features of such a system before these are imposed by governments.

Countries implementing or considering implementing measures to judge the quality of academic research include the UK, Finland, Netherlands, Germany, Romania, Thailand Australia, New Zealand, (HEFCE, 2006; 2008; Aalto University, 2009; Australian Research Council, 2009; Hutchinson, 2009, Sheehan, *et al.*, 2008). Funding and status can follow. Colleagues from countries where such exercises do not exist might be wise to prepare for the possibility that they will be held accountable in similar ways over time.

The UK Research Assessment system has developed over thirty years (Bernard, 2000 and Chatterjit and Seeman, 2007 provide an overview). In the UK 2014 exercise a new criterion for assessment has been introduced - impact of the research 20 years is to be demonstrated where possible as well as the significance and reach of the research, the quality of the research environment and the quality of the research outputs. The difficulties of judging impact are well documented and it remains to be seen how successful the UK assessment of research impact in the 2014 REF exercise is. See ESRC 2005, 2007, 2011, Leask in Arthur et al (2012), Onacea (2010), CHASS, 2005, Allen Consulting, 2005).

Our understanding is that the model used for the Australian ERA exercise in 2011 abandoned attempts by an earlier Australian administration to assess impact (Allen Consultancy, 2005; CHASS, 2005) and appeared to focus judgements on volume, excluding assessments of impact as did the NZ exercise (Willis, 2009). The experience of the UK is that criteria become increasingly stringent over time. The issues of research for impact are further explored in Leask 2012.

Knowledge management and knowledge transfer

In the UK, some other countries and within the OECD there has been considerable effort expended in knowledge mobilisation initiatives and knowledge management (KM) has emerged as a discipline across the public and private sectors (Collinson and Parcell, 2006; Davenport and Prusak, 1998; IDEA, 2006; 2008; Henley, 2008; OECD, 2003; Oakley, 2003; Newman and Holzman, 1997). KM is not to be confused with Information Management or the management of data. Knowledge management systems focus on capturing implicit knowledge held by individuals and moving this to explicit knowledge which can be accessed by others. In the UK and Australia, there is an expectation that universities must engage in knowledge transfer to ensure research has impact (Australian Govt., 2005; Howard Partners, 2005; Leask, 2010a; OECD, 2007a; 2007b).

Digital technologies provide a range of new ways to support knowledge management. For example, collaboration between institutions and networks of academics has always been a key way of pooling specialist knowledge across the disciplines but it has been costly. If digital technologies are used for virtual meetings and for publications, then the costs of collaboration are minimal. In some countries, today's Open Universities, as leaders in open and distance learning, might be the natural leaders of such collaboration but in others, the leadership may well have shifted to those organisations, universities or private companies, which have been able to innovate more quickly than others.

An example of an academic collaborative environment is provided by the Education Futures Collaboration initiative Education Communities www.educationcommunities.org . This facebook type environment is

available to all academics worldwide to participate in public communities and to apply to join private communities. Staff from subscribing universities are able to set up and manage private or public communities. Figure 4 shows the front page of the Education Communities and Figure 5 an example of an open community – the ICET Global Education First Catalytic Community.



Similar challenges about how to improve the knowledge base of practitioners exist across many areas of work. Local authorities in the UK provide about 700 services to local communities a Facebook type environment to support knowledge sharing and just in time learning across officers working in these local government services has been developed. See for example the Local Government Knowledge Hub <http://www.local.gov.uk/knowledge-hub>.

Changing practice

Q. What practices need to change in your system if teaching, learning and research are to use digital technologies to maximum impact? What mechanisms might you use to support and promote change?

Changing existing systems is problematic. Vested interests have to be accommodated, there will be fears about changes, and there will be issues of competence to be dealt with. These matters are acknowledged but are not the primary focus of this paper with one exception, that of accountability. Changing practice is more complex. The authors have found that a particularly useful model of change is Roger's theory of the diffusion of innovations (1983). In brief staff who are 'innovators' are encouraged to develop new approaches with leading staff 'early adopters' brought in only when the initial ideas have been tested out and found useful. 'Early adopters' then influence the 'early majority' to adopt new practices.

Change on a scale that leads to the creation of new opportunities for collaboration, collaborative research, publishing and accountability requires a plan to minimize the risk of creating a space that is less desirable than the present. Lewin's (1951) force-field analysis and change management tools represent two useful tools to help reduce this risk. The force field analysis is a useful tool for identifying factors (forces) for and against your decision or change. When deciding on whether or not to commence a change innovation at your institution it may be beneficial to consider answering one or more of the following questions prior to commencing the initiative

1. What benefit will the change represent for learning and learning
2. Who supports the change? Who is against it? Why?
3. How easy will it be to make the change? Do you have enough time and resources to make it work?
4. What costs are involved?
5. What other parts of your institution will be affected by the change?
6. What are the risks?

If after answering these question you decide the benefits outweigh the risk of not attempting the change then Lewin's (1951) change model provides a useful three step approach to change involving unfreezing the current situation, initiating the change, then refreezing things. Stage 1 involves getting buy in from your organization that change is necessary. This is usually achieved by communicating showing why the existing way of doing things cannot continue. Communication is also a key component of the second stage of this process the change process. In order for your colleagues to accept the change and contribute to making the change successful, they need to understand how the changes will benefit them. A useful communication strategy for this involves answering six questions for them

1. Where are we now
2. Where are we going
3. Why do we need to go there
4. What are we going to see along the way
5. What are we going to see when we get there, and
6. What will we see if we go too far?

(O'Meara, 2013)

This last question is crucial to avoid the period of change or thawing transforming into a messy period for all involved because the scope of the change became too large.

Applying these tools should provide some internal stimulus for change in response to the external drivers mentioned above.

Induction of new academic staff into research and publishing provides an opportunity for change. New staff should be made aware that the decisions made early on in their career can affect their career in a high accountability environment. Such decisions include ones about specialisms, methodologies, forms of publication as well as professional associations and conference attendance and networking. The researcher's reputation and the likelihood of the researcher gaining funding to undertake research with accompanying career advancement can be affected by these early career decisions.

Conclusion

The intention of this paper is to challenge the reader to look at longstanding educational and research problems anew and to find solutions which bring life-enhancing educational opportunities to the whole population and which make research-informed practice a reality across the board.

The focus of this 2013 conference of the Asian Association of Open Universities is "Leveraging the Power of Open and Distance Learning (ODL) for Building a Divergent Asia –Today's Solutions and Tomorrow's Vision".

This conference could mark a turning point in the education of the peoples of the region if opportunities outlined in this paper and across the conference to adopt more effective practices supported by digital technologies are grasped. The following questions are intended to support each individual and each academic attending the conference to review their current practices, to consider which are appropriate for a digitally connected world and which need to be adapted to the new global context for education and to create a vision to carry the work of AAOU members through to the end of this century.

What is your vision for the future in the areas covered by the conference themes?

Theme 1. Emerging Trends in Open and Distance Learning

Q1 Might developing and marketing MOOCs provide opportunities

- to provide widespread access to education
- to pool expert knowledge scattered through the region
- to network academics and research users through new models of research and dissemination supported by digital technologies of the sort outlined in this paper?

Theme 2. Building a Global Future through Research and Innovative Practices in ODL

Q 2 Could collaboration between the universities bring about engagement in a facebook type environment for academics promoting knowledge sharing and building and facilitating dynamic processes for publishing new knowledge and revising such publications periodically?

Theme 3. ODL and Human Capacity Building

Q 3 What professional development opportunities are required and what change management systems are needed to support the necessary changes in academic practice to realize the opportunities outlined above and through the conference? What theories of change management might guide decisions about how to proceed?

Theme 4. Technologies and Strategies for providing Education through ODL

Q 4 Are technologies of the quality provided by Web Ex, Adobe Connect and Blackboard Collaborate available to staff to facilitate communication across institutions? Are there professional associations in each country which support annual conferences, journal publication and knowledge transfer within each major discipline? At national levels, what infrastructure is needed to support access to education and research and knowledge transfer between educators? What could be provided now within the resources available in each country? What could be provided with a realistic amount of additional resource? What has to happen for that resource to be allocated to specific educational goals identified by AAOU members?

Theme 5. Application of ODL in Various Disciplines

Q 5 What are the current strengths in ODL in the different institutions in AAOU. Could combining efforts result in greater impact, efficiencies, and stronger knowledge bases underpinning the courses? If so, how could such collaboration be facilitated?

Many opportunities discussed here depend on the existence of an e-infrastructure to support rapid publication and collaboration between policy makers, practitioners and researchers in online communities of practice which allow members to be part of multiple communities and to play different roles in each community. The need for the creation of such an e-infrastructure is akin to needs for connectivity which led to the creation of national telephone, road and rail networks. Publicly visible examples of such interconnected professional networks are provided by www.educationcommunities.org for educators, or www.communities.idea.gov.uk for local government in the UK. Disciplines able to access this form of infrastructure can expect to see significant changes in the speed and extent of dissemination of research and its consequent impact.

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A workshop for those interested in the educational approaches outlined is being held on June 16-19 at the 58th ICET World Assembly, University of Ontario Institute of Technology, Oshawa, Canada. See www.icet4u.org for information.

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