"Promoting the Visibility of Educational Research Through an Institutional Repository"

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Abstract

Established in 1994 through the amalgamation of several teacher training colleges, The Hong Kong Institute of Education is the major multidisciplinary teacher education provider in the Hong Kong SAR. Despite this, the Institute does not have a particularly high research profile when compared with its peer institutions in Hong Kong and around the world, with its research publishing achieving modest exposure and impact in international educational research literature. The Institute has a goal to attain the title of a "university of education" and has identified an improvement in its research output and profile as critical to achieving this. It was in this context that the HKIEd Library embarked on the redevelopment of its institutional repository, changing its direction from being an archive of institutional publications to one which brought together and offered access to the sum total of published output of the Institute since its foundation, in a deliberate effort to promote Institute research. This paper explores the particular approach taken by the Library to the development of the institutional repository, how the repository contributes directly to and aligns with the research strategies of the Institute, and the impact the Repository has had so far on improving the profile of research at HKIEd.

Introduction

The establishment of an institutional repository has become a commonplace activity of academic libraries in the recent past, fuelled by the ready availability and relatively simple implementation of a number of open source software platforms and operating systems. However, the proliferation of repositories in academic libraries worldwide occasionally suggests that this trend is technology rather than demand driven. In general, the in-house development of a repository typically requires a time-consuming and labour intensive accumulation of bibliographic data and full-text, and a concerted effort to either encourage or compel researchers to deposit pre-publication or otherwise copyright free copies of their work into the repository. To make the venture successful, it is critical that this effort can be sustained long-term, and becomes part of the mainstream activities of the Library.

While the body of evidence supporting the value of open access repositories is growing, given the implementation costs and long lead times involved, university administrators might be forgiven nonetheless for questioning the eventual and direct benefit at the "micro" institutional level of investing in the development of an institutional repository. While a repository might make published research available and accessible, does that necessarily translate into actual use, and therefore make the institution's research more visible in a practical sense?

The rhetoric of open access is that the presentation of the institution's published research output via a repository will inevitably improve its visibility and raise the profile of both the institution and the researchers involved, and potentially lead to greater citation frequency and impact of the published items. This appears to be supported by recent research on open access[1], in which it is concluded that placing research publications on open access leads not only to greater end user access but also to increased citation counts for the author, as well as greater potential for cross-disciplinary research. In the Hong Kong context, it has also been suggested that open access supports recent Government University Grants Committee initiatives for the assessment of research impact, as well as the potential for knowledge transfer, through the greater accessibility of research output.[2]

In this paper, the development of an institutional repository by the Library of The Hong Kong Institute of Education will be discussed in the context of pressures of time and production cost in the development of the repository, and in terms of the immediately measurable impact that the repository has had. While many such studies

might demonstrate the value of a repository over time, this study focuses in particular on the immediate effect after the repository was launched.

The Research Profile of HKIEd

The Hong Kong Institute of Education was established as a specialist teacher education institution in 1994, through the amalgamation of five teacher training colleges and institutes. The Institute is celebrating its 15th anniversary this year, and can also claim a 70 year history of teacher education in Hong Kong, with one of its former colleges – the Northcote Training College - being established in 1939.   The Institute currently has a student population of 6385 students[3], across a range of programs at Bachelor, Masters and Doctor of Education levels, in addition to Associate and Post-Graduate Degrees and ancillary programs. In 2004, the Institute was granted self-accrediting status, and has in recent times moved to diversify its curriculum in line with the increasingly diverse educational requirements of Hong Kong.

Over the past few years, the Institute has made a highly public and at times controversial bid to attain university status. Although it is one of eight Government funded institutions of higher education in Hong Kong, it is the only one lacking a university designation. It is often felt that this is impeding the Institute's development as it discourages higher quality students from choosing teaching as a career and is hindering the Institute's efforts in a range of developmental activities such as attracting major benefactors.   In response to this, in 2007 the Institute formulated a *Development Blueprint*[4] for the next ten years: outlining its strategies and initiatives for raising its visibility and profile, diversifying its curriculum, improving the quality of its teaching and research, and making a more deliberate attempt to establish itself as a university of education.

Central to this initiative and the claim to university status were plans to enhance the research infrastructure and capacity of the Institute through a range of programs and initiatives to nurture research and research training, along with a concerted attempt to improve both the frequency and the quality of published research output of staff members. Perhaps owing to its deep roots in vocational teacher training, the Institute has lacked a critical mass of scholars and researchers publishing in the field of educational research, and has under-performed in assessments of its research output and capacity against other UGC funded higher education institutions in Hong Kong.[5] Likewise, the publishing of Institute staff has traditionally not achieved a significant

impact (according to traditional evaluation tools such as the *Social Sciences Citation Index*) in international peer reviewed literature. This may reflect issues such as type and choice of publication and a relatively high level of Chinese language publishing as much as it does the criteria used by the major research tools for the evaluation of research. The problem remains, nonetheless, that the Institute lacks a cadre of active researchers and fails to achieve much visibility for the research that it does publish. Despite this, in the UGC review of the *HKIEd Development Blueprint*, the advancement of research and a research training environment were regarded as critical to the future of the Institute. [6]

Development of the HKIEd Research Repository

It was in this context of a conscious Institute attempt to build research capacity and output that the Institute Library initiated the development of a "research repository" of staff publications. While the Institute Library had previously developed an institutional repository, this had concentrated on the digitization and organization of a range of "in-house" Institute publications, such as calendars, student handbooks, and commemorative publications. Hitherto, the function of the repository had been to serve as a digital reference collection of Institute administrative publications rather than of research publications. Consequently, the new project effectively entailed the re-building of the existing repository to focus primarily on staff research.

Named "The HKIEd Research Repository", the re-launched institutional repository is an online archive of all major scholarly and research publications produced by staff members of the Institute from the foundation of HKIEd in 1994 through to the present day. The Repository aims to support HKIEd strategies for building research capacity by providing a single point of access to staff publications and to achieve the following objectives;

1. *To strengthen research capacity by providing a reference database of all published research in HKIEd.*
2. *To enable HKIEd colleagues to share their research publications easily and to highlight their research and publishing interests and record.*
3. *To improve the visibility of HKIEd research by making publications easily accessible to the outside world.*
4. *To enable the Institute to demonstrate the depth of its research efforts to stakeholders, such as the University Grants Committee.*
5. *To provide a convenient self-archiving mechanism for published output, enabling*

staff to manage an online collection of their own publications for research and citation purposes.

6. *To provide a platform for the archiving of unpublished works such as dissertations from the newly established Doctor of Education program as required.*

7. *To provide a flexible database through which HKIEd staff publications can be searched for and accessed by author, title, department, subject and year of publication, replacing previous non-searchable "listings" of staff research publications.*

8. *To provide a means by which the collective publishing effort of a department or faculty can be viewed in one search.*

Methodology for Repository Development

Prior to the establishment of the HKIEd Research Repository, the public reporting of research publishing at the Institute had been largely through an author listing posted to the Research and Development section of the Institute website. This listing had a number of drawbacks which limited its effectiveness in promoting the Institute's research. Chief among these was that the listing could not searched by any field such as author, title or subject, therefore restricting its use to browsing through the alphabetical listing. Although the listing was in HTML format, it did not hyperlink to the full-text or abstract of the papers listed. In addition, as the listing was extracted from an annually updated database of staff publications, it was not up to date, with more recent publications being listed in a separate monthly Institute staff bulletin.

As a result, an early focus of the Library's Repository project was to improve on this situation by developing a database which was highly flexible in terms of search capabilities, but which would also link wherever possible to a full-text version of the publication. To be credible as the central database for all research output of the Institute, as well as a viable alternative to the above listing, the Research Repository also needed to accumulate a critical mass of citations and linked texts in a relatively short period of time. This way, upon its launch, staff and other users could have confidence in interrogating it as a reliable and comprehensive collection of Institute research publications.

A mandatory reporting system is in place for all research output of academic staff at The Hong Kong Institute of Education. This reporting mechanism follows the Common Data Collection Format developed by the Hong Kong University Grants

Committee to report statistical data from all UGC funded institutions, and is required for the external reporting of research to both the UGC and the Research Grants Committee. The register of research output as compiled at HKIEd contains standard bibliographic data such as author, title, and publication details, and also breaks down the cited items according to publication type: monographs or monograph chapters, journal publications, conference papers and so on. As this system had been in place for some years, it became the basis for the subsequent development of the Library's Research Repository, through the harvesting of all relevant fields in this reporting mechanism to populate the repository. Above all, this enabled a substantial database of citations to be compiled in a relatively short timeframe and at little cost, avoiding the usually long lead times of institutional repository development. The development path for the HKIEd Research Repository included the following;

Platform Selection - In the course of piloting the project, a review was undertaken of the available open-source digital repository products, during which it was decided to adopt the DSpace[7] software as a relatively simple and user friendly platform for the repository. The DSpace product is open source software which has been developed by MIT in collaboration with Hewlett-Packard, specifically for the purpose of enabling institutions to self-archive research and publishing. It is in use by over 350 institutions worldwide, and is also the software platform in use for other institutional repositories in Hong Kong, including the University of Hong Kong[8], Chinese University of Hong Kong[9], Hong Kong University of Science and Technology[10], and more recently the Polytechnic University[11]. For an institution of the size of HKIEd, one of the chief benefits of DSpace is that as an open source product the development and sustainability of the database is much easier to achieve at much less cost.

Pilot Project - A pilot phase was conducted to demonstrate to Institute stakeholders the flexibility of the search mechanisms and different ways of linking full-text output to the bibliographic citation. To undertake the pilot, the 2006-07 reported research output across major categories (such as book, article and conference paper) was harvested from the Institute's Staff Academic Profile (SAP) system and uploaded into the trial Research Repository. An electronic version of the full-text of selected citations was located and linked to the citation, to demonstrate the full functionality of the database. Having established "proof of concept" to the Institute with this pilot project, it was also decided to limit the collection of data in the first developmental phase of the Repository to the major publication categories of: monographs and monograph chapters, journal publications, conference papers, and gray literature such as research reports.

Data Transfer _Programming work was completed to transfer bibliographic citations easily from the Institute SAP database to the DSpace-based Research Repository. All key bibliographic citations listed in the SAP database were then harvested and reformatted into the DSpace format, to provide a full collection of bibliographic citations from the most recent publications back to the establishment of the Institute in 1994.

Citation Linking – Once all retrospective data had been transferred into the Research Repository, Library professional staff then commenced the task of locating electronic full-text versions of each citation and linking these (where allowable by copyright) to the citations.

Launch and Digitization – Once a critical mass of citations and full-text had been accumulated, the HKIEd Research Repository was launched and became available to Institute staff, students and the wider research community. Following the launch, the focus of the Library's development effort turned to locating print versions of items which had not been located through commercially available databases, and digitizing these so that they too could be linked back to the relevant citations. This was a time consuming and difficult process as it was imperative that the appropriate version of the item was sourced (ie: matching the bibliographic citation precisely) and that any copyright issues were resolved beforehand.

Self-Archiving – Once the Research Repository of published material had been established and was operational, the Library followed up by inviting academic staff to self-archive publications, by checking publications listed under their names in the Repository and submitting citations and copyright cleared versions of publications, or pre-publication versions. This remains an ongoing process which complements the Library's own efforts to retrospectively locate and make available full-text versions of all citations listed in the Repository.

Maintenance – The Library continues to harvest data from the Institute Staff Academic Profile database on a regular basis, and undertakes the process of linking citations with full-text versions of the item, repeating the process above.

Launch and Profile of the HKIEd Research Repository

The soft launch of the Repository took place in late January 2009, when the initial

database – consisting of approximately 9000 staff publications - was first released for use by Institute staff. This comprised the entire research output of the Institute in the publication categories given above, from the establishment of HKIEd in 1994 through to the present day. Of these 9000 citations, at the time of the soft launch of the Research Repository, it had been possible to locate and link to the full-text of 900 items from international electronic databases for which the Library held subscriptions.

This relatively low ratio of full text items to bibliographic citations may reflect some characteristics of academic publishing and accessibility in the particular context of the Institute. For example, it is possible that the Library does not subscribe to a number of the databases, e-journals and e-books in which HKIEd staff have published contributions, accounting for the low "hit rate". However, this is unlikely given the thorough coverage of education related electronic material accessible via the Library. Another possible cause is that since the database goes back to publications from 1994, a number of earlier publications have never been published or re-published in electronic form. In addition, one other likely cause of the low rate is the type of research and publishing activity which has been undertaken in the past by Institute academic staff.

Table 1 provides a breakdown of the citations that have been harvested and transferred to the Research Repository as of March 2009. At the end of March, 9884 items were collected into the Repository in the major publication categories identified in the Table. While it has been possible to locate commercially available full-text versions of 16% of cited monograph chapters, and a further 22% of journal publications, less than 1% of the 4619 conference papers have made their way into the "electronic press". Consequently, while conference papers account for almost half of the publications cited, very little of this is available electronically, with a corresponding impact on the low number of items which could be linked to the Research Repository at its launch.

Table 1 – Data on Number of Citations and Full Text Articles Housed in the HKIEd Research Repository as at 26th March 2009.

Citations Total	As at 26-Mar-09		
	Chi	**Eng**	**Total**
Books, monographs and chapters	1682	1153	2835
Journal publications	704	1454	2158
Conference papers	1104	3515	4619
School textbook/user guide/ teacher handbook	141	26	167
Postgraduate research theses	14	91	105
Total	**3645**	**6239**	**9884**

Full Text Total	As at 26-Mar-09		
	Chi	**Eng**	**Total**
Books, monographs and chapters	265	197	462
Journal publications	22	456	478
Conference papers	14	27	41
School textbook/user guide/ teacher handbook	1	1	2
Postgraduate research theses	0	1	1
Total	**302**	**682**	**984**

Use of the Repository to Promote Institute Research

As mentioned earlier, in response to the Report of the UGC Review Group on the *HKIEd Development Blueprint*, a greater emphasis has been placed recently on improving the visibility of Institute research output. As the Research Repository is tailor made for this purpose, it was decided by the Institute shortly after the launch of the Repository to create a link directly from the HKIEd Research website to the Research Repository, replacing the previous research listing of staff publications. This meant that there was an access path to the Repository through both the Research and the Library websites, making the Repository immediately more visible to the public, and establishing it as the central, most up to date, and comprehensive record of research in the Institute.

This development has taken place alongside the revamp of the Institute Research website, and a project to document individual staff members' research profiles and publishing record through the establishment of personal websites. These projects are

complementary insofar as they will be drawing records from the same source, although the Research Repository offers greater flexibility in terms of searching by a number of fields (such as subject or title), and the ability to scan the research output of an entire department at one glance. In many cases, the Research Repository is already directly linked to the academic staff profile as the most reliable record of published output.

Initial Response to the HKIEd Research Repository

Within a month of the launch of the HKIEd Research Repository and its subsequent linking to the Institute's Research website, the web traffic tool Google Analytics was applied to the Repository to provide a simple and no-cost means of tracking patterns of usage. In the subsequent two months of operation, this has produced some interesting and immediate indications of the level and type of usage.

The Google Analytics data for April 2009 recorded that a total of 5255 visits were made to the site over the month by 4413 visitors. This has effectively been repeated in May, with 5538 visits made by 4692 visitors during the month. While this represents an average daily access rate of 175 and 184 for April and May respectively, what has been of chief interest is the actual source of the traffic. In both months, it has been reported that over 75% of the traffic on the Research Repository site has been via search engines, with between 11% to 14% being via referring sites such as the Library and Institute research websites. Direct access to the Repository site is responsible in both months for 10% or less of the total traffic. Table 2 provides raw data on the hit rates and source of traffic for these first two months of analysis.

Table 2 – Traffic Analysis of HKIEd Research Repository

	April 2009	**May 2009**
Visits		
Visitors	4413	4692
Visits	5255	5538
Page views	52560	43551
Source of Traffic		
Search Engines	75.17 %	78.60 %
Referring Sites	13.99 %	11.47 %
Direct Traffic	10.85 %	9.93 %

What this traffic analysis would appear to indicate is that the majority of accesses to the HKIEd Repository website are coming about through text searches conducted via search engines such as Google or Yahoo, and that these are linking directly to items cited in the Repository. It can also be concluded that this method of access to the Repository is more common and more popular than accessing the Repository website directly, or by linking to it via a referring site such as the Library website or the Research homepage, albeit that both of these also appear to draw some traffic. The inference that might also be drawn from this is that awareness of the existence of the Research Repository is of secondary importance when compared to the function it serves to link with internet searches to make Institute research publishing more immediately accessible.

Further evidence of the Repository's role in attracting external interest in Institute publishing is suggested by the country source of the traffic. Table 3 is a listing of the top ten countries of origin for visits to the Repository. While indicating that the majority of traffic is from within Hong Kong itself, it is encouraging to see that the Repository is also generating visits from Mainland China, the United States, Taiwan, Australia and a number of other countries. One further interesting feature of the May traffic is the emergence of visits via the Chinese search engine Baidu, possibly reflecting the searching of Chinese as well as English language publications housed in the Repository.

Table 3 – Country Source of Visits to HKIEd Research Repository

Country Source of Visits	April 2009		May 2009	
	Traffic	%	Traffic	%
Hong Kong SAR	3339	71%	3314	68%
China	370	8%	611	12%
United States	329	7%	273	6%
Taiwan	287	6%	263	5%
United Kingdom	97	2%	127	3%
Australia	77	2%	98	2%
Macau SAR	77	2%	72	1%
Canada	61	1%	44	1%
Singapore	40	1%	45	1%
Total	**4677**	**100%**	**4847**	**100%**
Total Visits	5255		5538	

% of Total Visits	89%	88%	

Future Development of the Repository

Since the launch of the Research Repository, a number of potential areas for improvement have been identified. The most significant of these has been a demand from academic staff using the Repository to archive and highlight their complete published output by including a range of "non-traditional" formats, such as musical scores, newspaper articles, speeches and so on, to reflect the entirety of the work that they do, as opposed to formal papers. In addition, with changes mooted to the faculty and departmental structure of the Institute, some difficulties have emerged with the linking of some records to previous departmental names, suggesting that it may be more appropriate to associate records with broad subjects or disciplines rather than with specific departmental names. However, the above traffic analysis may suggest that access at a departmental or "community" level is not particularly common. Both changes will be implemented when the Repository is migrated to the most up to date version of the DSpace software in the near future.

Conclusion

The purpose of this paper has been to explore from the practitioner level some of the issues associated with the development of an institutional repository, and to offer some insight into the impact that a repository may have on the visibility of published research. While the above analysis may indicate a modest initial take-up of the HKIEd Research Repository when compared to typical Library web traffic overall, what it does suggest is that the making available of academic research through this means can have an immediate impact on making research more visible. As there was virtually no online public access to Institute publications prior to the establishment of the Repository, and a relatively small amount of this publishing existing in electronic form, it would appear from the source of the traffic that the majority of this interest is new and is identifying research publishing which had been largely invisible in the past.

It should also be added that despite the Repository becoming accessible via the Institute Research website shortly after its launch, the level of traffic which has been generated so far has occurred without any significant promotion of the Repository outside of the Institute. This may also suggest that researchers are mainly discovering

and accessing HKIEd publishing opportunistically, rather than through systematic or deliberate searches of the Repository either directly or via the Library and Institute websites.

In these very early stages of its development, the Research Repository has begun to demonstrate its value to The Hong Kong Institute of Education in both supporting and promoting Institute based research. The Repository is providing convenient external access to publishing besides offering Institute staff a means of organizing and archiving their own research, and sharing this with both colleagues and the community. The Repository also operates at two levels, first by organizing and providing multiple points of access to bibliographic citations for all Institute publishing since its founding in 1994, but also by providing immediate full text access to the published work where it is available. The future development of the Research Repository will focus on this second level, to create a full-text database of all Institute publishing for the benefit of the wider educational research community worldwide.

Notes

[1] Gunther Eysenbach, "Citation Advantage of Open Access Articles." *PLoS Biol.* 4(5) (2006).   http://dx.doi.org/10.1371/journal.pbio.0040157 (accessed 30 May, 2009).

[2] John Bacon-Shone et al, "The Open Access Advantage", Hong Kong Open Access Committee, 2008. http://hub.hku.hk/handle/123456789/49851 (accessed 30 May, 2009).

[3] University Grants Committee, *Facts and Figures - Academic Year 2007/08*, 25 (Hong Kong SAR: UGC, 2008). http://www.ugc.edu.hk/eng/ugc/publication/report/figure2007/index.htm (accessed 3 June, 2009).

[4] The Hong Kong Institute of Education. *Development Blueprint: Becoming A University of Education*. (Hong Kong SAR: HKIEd, 2007).

[5] University Grants Committee. *Excellent Results from the Research Assessment Exercise 2006.* http://www.ugc.edu.hk/eng/ugc/publication/press/2007/pr02032007.htm#annex (accessed 30 May, 2009).

[6] University Grants Committee. *Report of the Review Group on Hong Kong Institute of Education's Development Blueprint.* (Hong Kong SAR: UGC, February 2009).

[7] DSpace. http://www.dspace.org/ (accessed 30 May, 2009).

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8   The HKU Scholars Hub. http://hub.hku.hk/ (accessed 30 May, 2009).

9   The Chinese University of Hong Kong Scholarly Institutional Repository. https://dspace.lib.cuhk.edu.hk/index.jsp (accessed 30 May, 2009).

10 The Hong Kong University of Science and Technology Institutional Repository. http://repository.ust.hk/dspace/ (accessed 30 May 2009).

11 The Hong Kong Polytechnic University Institutional Repository. http://repository.lib.polyu.edu.hk/jspui/   (accessed 30 May, 2009).