Information Literacy in a researcher's learning life: the Seven Ages of Research

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Abstract

This article uses data from research conducted in the course of writing a book on the needs, wants and characteristics of researchers to examine how researchers view themselves and the research process. As a result of this, the Seven Ages of Research model was developed which categorises a researcher’s learning life into a series of discrete stages. The article explores learning needs relevant to each age in the learning life and links them to the development of information literacy. The authors explore the polarisation that exists between what researchers think research is about and what they believe the library can offer them, and suggest that information literacy needs to be seen as involving a change in understanding of, and attitude to, the world of information, as well as the nature of those information needs. Finally they explore the librarian's role in an e-environment which has changed the way researchers work and identify some of the challenges facing LIS professionals in the future in supporting researchers throughout their learning lives.

Introduction

This article is based on research undertaken for ‘Providing Effective Library Services for Research’, a book which focuses on the needs, wants and characteristics of researchers and how effective library and information services (LIS) can be developed and managed to support research and researchers. It uses data from the research to examine how researchers view themselves and the research process, categorising a researcher’s learning life into Seven Ages of Research. Learning needs relevant to each stage in the learning life are then linked to the development of information literacy.

When the book was written, the data collected from the interviews with researchers was blended throughout the text, being used to provide illuminative snapshots of what it meant to be a researcher and how researchers regarded and used libraries. However, much of the data had, of necessity, to be omitted from the original text. and this article provides the opportunity to re-examine the data in the context of measuring the development of information literacy throughout a researcher’s learning life.
The work proved particularly timely as it coincided with a series of the Research Information Network (RIN) and the Consortium of Research Libraries (CURL) studies of how researchers interact with academic library and information services in the UK, which it is hoped will inform and shape debate about the future development of such libraries and their services to researchers.

Perceptions

It is clear that the 21st century e-revolution has led many to consider how LIS are changing and adapting to new research approaches. At a time when budgets are declining, there is increased need for performance measurement in order to justify what is being done to support service users, including researchers. Discussion with library colleagues about their perceptions of the place of libraries in a researcher’s life led to the following ‘hypotheses’

- Libraries are decreasing in importance to researchers
- Information is retrievable in other ways
- Print collections are less relevant
- Libraries are perceived by users to be more geared to supporting teaching and learning activities
- Libraries are developing into social learning spaces

Data collection

Initial data was collected during a workshop with UK researchers in which they were encouraged to identify their role as researchers and to specify their learning and research needs. Individual face to face, telephone and email interviews were conducted with UK researchers and an international dimension included email and telephone interviews with
researchers in Belgium, China, Denmark, Japan, Netherlands, South Africa, Spain, Sweden, Thailand, Turkey and the USA.

Given time differences and potential language difficulties, the interviewees were given the option of being interviewed either by 'phone or by e-mail. The questions covered such topics as frequency of use of libraries; likes/dislikes about them; problems in tracing references etc. Interviewees were assured they would be anonymised in the book, although the country in which they were working, their discipline and the level of their research would be indicated.

Interviews were conducted with thirty six researchers in a variety of disciplines and institutions in the UK and overseas (twelve countries in all), at various career stages. These ranged from recent doctoral students to those who had been in research for several decades. The following illustrate the two ends of the spectrum:

“I consider myself to be at the start of my research career, although I have been doing research for about 4 years”

““I have 5 years to retirement but research is becoming more important in my career. I still have one, even though retirement is looming”

What is research?

What exactly do we mean by ‘research’? The main phrase which recurred during an examination of a variety of resources was ‘systematic investigation’. Such an investigation is made to discover, interpret or revise facts or theories. Another recurring description of research was that of developing or contributing to ‘generalisable knowledge.’ So research activity primarily involves the discovery of knowledge not previously known or understood or the development of a new way of organising or structuring known material that provides a new understanding about its subject matter. Scholarly research therefore is systematic or methodical, involves the discovery and interpretation of facts or the revision of
accepted theories in the light of new facts. It may also involve the practical application of new or revised theories.

**What is a researcher?**

During the workshop with researchers, participants were asked to define what they were and what they did. In response to this, a cross-section of researchers attributed to themselves the following characteristics:

- Questioning
- Reflective
- Active
- Ready to be challenged
- Trying to extend boundaries, work within and between disciplines
- Making connections
- Keen to “share what they find – out knowledge into the public domain”

A researcher is someone with “enthusiasm, an almost insane desire to know more about you are interested in…”

However, the priority given to each of the above characteristics varied depending on the stage of the researcher’s career. It became obvious from our discussions and interviews with researchers that there were many stages and levels at which they found themselves. An early stage researcher, for example, could be an A-level student or somebody engaging in family history study. Although many students undertake research projects during the course of their academic careers and there are many researchers outside formal education – be they passionate amateurs or literary biographers. This article confines its consideration to scholarly research in academia, which is defined as commencing with the postgraduate degree, namely the Masters (frequently an MPhil with the option to continue on to a PhD) and the PhD.
What researchers do and why

When asked what their research comprised, researchers used the following verbs:

- Investigate
- Purposefully enquire
- Gather evidence/data
- Confirm or refute theories
- Interpret
- Synthesise
- Disseminate

When asked why they engaged in research, researchers said they did it for themselves, for their peers and for the ‘world’ and that they might do it individually, as part of a team or leading a team.

Information Literacy and research – some definitions

"Information literacy is the adoption of appropriate information behaviour to identify, through whatever channel or medium, information well fitted to information needs, leading to wise and ethical use of information in society." (Webber)

The definition of learning as involving “the constant search for meaning by the acquisition of information, reflection, engagement and active application in multiple contexts” (Learning Reconsidered) can equally well be applied to research.

Combining these two concepts has led the authors to develop an understanding of information literacy as changing an individual’s attitude to their learning and research so that they are explicitly thinking about how they “use, manage, synthesise and create information, in a wise and ethical manner, to the benefit of society”, as part of their learning life. In this view, information literacy is central to learning and research and is
about changing people’s learning attitudes and habits so that they understand how information fits into their learning lives. Central to this understanding is the theory of threshold concepts and troublesome knowledge espoused by Meyer and Land (2005). We can see that to develop as an information literate person, an individual must cross a threshold in their attitude to and understanding of information in their personal research environment. Information literacy, therefore, encompasses skills, such as how to use a library and more complex information management skills (e.g. using Endnote effectively to create bibliographies), but also less tangible issues such as understanding the scholarly communication debate and our own place in the information environment.

The “seven ages of research” model

On the basis of discussions and interviews conducted with researchers from around the world a model has emerged which identifies seven ages of research which can be used to study learning and information needs throughout a researchers learning life: The seven ages are defined as:

1. Masters students
2. Doctoral students
3. Contract research staff
4. Early career researchers
5. Established academic staff
6. Senior researchers
7. Experts

Progression through these different ages is accompanied by a changing attitude to what researchers do and, in consequence, there are differing needs at each stage.
The 7 Ages model: Ages 1 & 2 [Masters and Doctoral students]

Craswell (2007) cites Harman’s report of 2002 which indicated that only 54.6% of Australian higher degree research students anticipated following research careers so in fact Masters and Doctoral students may be undertaking research for a limited period and may see this as a means to an end rather than a permanent career in academia. Indeed, if they work alongside staff from ages 3 and 4, it will become apparent to them how, as Tynan and Garbett (2007) comment:

“Getting a foothold on the academic ladder can be a daunting prospect” (Tynan and Garbett 2007: 411)

In terms of research, the Roberts Review (covering the supply of science, technology, engineering and mathematics skills throughout the education system) highlighted two major issues. Firstly, the fact that, in the short term, PhD study was financially unattractive, as were careers in academic and industrial research for which scientific PhDs are a requisite. Secondly, that PhDs did not prepare people with transferable skills appropriate to academic and business working environments, echoing the Research Councils’ Joint Statement of the previous year. The Roberts Review recommended that HEIs take responsibility for ensuring that all their postdoctoral researchers had a clear career development plan plus access to appropriate training opportunities. It further recommended that all relevant funding from HEFCE and the Research Councils be made conditional on HEIs implementing these recommendations.

The 7 Ages model: Ages 3 & 4 [Contract research and early career staff]

The Roberts Review also discussed the problems affecting postdoctoral and other contract research staff (CRS). Among these were the lack of a clear career structure, low
levels of pay and unsatisfactory training. Work on a short-term contractual basis is a major barrier to the recruitment and retention of researchers (Tynan and Garbett 2007). There is no clear professional trajectory and little possibility for salary progression within contract research. Salaries compare badly with those of scientists and engineers so that HEIs cannot compete in the job market. Like PhD students, CRS may receive little or no training in transferable skills or continuing professional development, leaving them inadequately prepared for potential careers.

Those in researcher ages 3 and 4 may find themselves somewhat marginalised, subject to a heavy teaching load and lacking access to research funding (Tynan and Garbett 2007). One third age researcher commented how she was

“on short-term contracts all the time. While this concentrates the mind wonderfully in terms of ensuring you produce the best work you can all the time, it is also very stressful. It can mean lack of continuity in projects.”

This marginalisation can lead to the application of the deficit model and Grant and Knowles comment on how those in academic life (especially women) can run the risk of being labelled as a group “in need of remediation” (Grant and Knowles 2000:6)

Higher education’s research base distinguishes it from other spheres of education and teaching and research at HE level are deemed mutually beneficial. While not all staff need to be active researchers, the environment in which students learn should be underpinned by active research, and ideally students should have access to staff who are practicing researchers in order to impart ‘cutting edge’ knowledge (Breen and Jenkins, 2002).

Although the heavy workload experienced by fourth age researchers may pose problems, in fact teaching may also serve to benefit their research since imparting their knowledge to others may help to clarify the research for the researcher.
As Tynan and Garbett (2006) indicate, those in the fourth age are under pressure to perform and ‘join the game’. The volume of output, as a consequence of the RAE, can be the key to promotion and in consequence as one of our interviewees commented:

“There is a danger of stunting blue sky thinking. Younger researchers can’t afford the luxury of blue sky and danger or risk in their research. For promotion they feel they need volume”

Another interview spoke of the RAE as

“designed to destroy scholarship in the belief that research needs to be directed instead of being allowed to flow, via serendipity.”

At this stage of their career, researchers need to be ‘encultured’ as a successful researcher (Tynan and Garbett, 2006) but, unfortunately, the thoughts of several researchers at this stage of their career were echoed by one who commented that:

“The University system doesn’t support and motivate those doing research well”

The 7 Ages model: Ages 5 & 6 [Established academics and senior researchers]

Researchers in this stage of their career are main grade academics, deans of research, heads of research teams and other people who bring research funding into the institution. While they may still have some teaching commitments they are likely to be developing a name for themselves within their subject and, in consequence, are usually in a position to negotiate more in terms of their workload.

Financing research through funders such as research councils is a competitive source of support for those demonstrating excellence or innovation, identified via peer review. Unfortunately the degree of selectivity is already constraining many institutions, especially newer universities: figures from the 2001 RAE show that 75% of HEFCE research funds are allocated to fewer than 20 HEIs.
So, although this group comprises established, successful grant holders, experienced in supervising postgraduate researchers and with strong publications records, they may find that less blue sky research is possible and that they have to make choices in terms of how their research relates to ‘UK PLC’: Two of our interviewees identified this issue:

“The relationship between funding and potential funding sources and the direction of the research that I want to do – can be limiting. Sometime I could change the direction or diversify but I am stymied by the pragmatism of where the money will come from.”

“In recent years there is more conformity and the eccentric is frowned upon”

Increased research selectivity risks stifling small centres of excellence or dispersed and single scholars. Further concentration of research funding would also have an adverse effect on the development of practice based and hence industry-linked research in new universities contrary to the desire expressed in the White Paper to increase such links.

**The 7 Ages model: 7th age [Expert]**

This group comprises the experts, internationally known and highly cited researchers and researchers at this career stage are probably the least stifled by the demands of systems such as the RAE. One interviewee corroborated this:

“If you are recognised and already established you don’t have to change. Newer researchers have to be much more conservative in what they choose to do”

At this stage in their careers, researchers are likely to have a grasp of the administrative and leadership features of successful research but may still have issues in terms of finding people to conduct research on their behalf:

“Achieving sufficient grant funding to employ people of sufficient quality to perform the research that I don’t have time to do myself.”

It is possible that people of ‘sufficient quality’ in certain disciplines, especially the hard sciences, will be attracted to areas outside of academia where the rewards may be
greater. There may be a long-term risk for seventh age researchers in terms of third strand activities.

While teaching and research are clearly central to the idea of a university, the importance of ‘third strand’ activities involving university relations with business, industry and the regional agenda is being increasingly recognized. Initially, ‘third strand’ activities were defined as anything other than the universities’ core business of teaching and research. However, an integrated ‘third strand’ programme can complement a University’s established teaching and research activity and such programmes are now becoming embedded –and sustained – within university culture. In respect of third strand activities, universities are increasingly appointing ‘non-academics’ with experience in industry or other relevant external employment sectors. Such trends may ameliorate the situation where many of the best PhDs are leaving their discipline for other careers or, indeed, leaving the country to conduct research or to work elsewhere, for example the USA but it may result in fewer opportunities for academic staff to engage in research.

Learning needs and the 7 ages model

Ages 1 & 2

Craswell (2007) indicates that supervisors and supervisory teams are seen as having primary responsibility for the research training of Masters and Postgraduate students, although the impact of the Roberts agenda on professional research training practice should not be ignored. Are supervisors, tutors and mentors able to satisfy first and second age researchers’ learning needs? Our interviewees commented on the variable quality of supervisors, their occasional lack of cooperation and lack of guidance/guidelines to assist their mentees:
“I don’t think I was a good researcher for my PhD. You need to have a mentor...work alongside someone successful”

Potential mentors/supervisors who were interviewed stated that what they were looking for was:

“A number of competent graduate students who could be a part of research team.”

Researchers at this early stage of their career are still influenced by their previous educational background. They are driven by their own expectations and by external pressures, including managing other jobs and personal circumstances as well as, in the case of second age researchers, developing teaching skills.

At this stage of their career they are still learning about the subject itself and developing confidence to reflect and to self-assess. They need guidance in academic writing and preparing a dissertation or thesis for publication as well as efficient information retrieval.

As one interviewee commented:

“The retrieval of information is not well taught in our undergraduate courses. Information management has become a critical factor in postgraduate work, and many of our students have a poor foundation so waste a great amount of time”

This requirement is all the more critical when the notion of the unique contribution made by a PhD thesis is considered. The thesis and its underpinning research must be publicly defended in full confidence that the work represents an original contribution to knowledge of an appropriate scope and scale.

Ages 3 & 4

At this period of their research careers, researchers may be moving into a new specialism, changing role and generally ‘learning the landscape’ as part of their enculturation process. They are trying to situate themselves, make a name for themselves and establish their credentials locally (i.e. in their school or division) and also in the wider research community.

At this stage researchers are likely to be asking to whom they may turn for support. Peers and colleagues are increasingly important in order to avoid isolation.
“You need to have a mentor – to show you the ropes and pitfalls …You can train for some things but best is to work alongside someone successful and learn from them. Getting a good mentor is down to chance”

A caring supportive environment may produce a mentor or critical friend. Is this an opportunity for the liaison librarian? Could they fulfil the role of critical friend?

Needs at this stage of a research career include academic writing skills and knowledge of the language of the subject:

“Once a person has achieved a formal post grad qualification, everyone expects you to publish. But there is much more to preparing an article for publishing than just writing it.”

“I went to an excellent workshop on writing journal articles, and after that I achieved my first publication within a very short space of time –the light came on!”

Workshops such as the one mentioned by the last interviewee can also afford an opportunity for exchange of experience with other researchers. However, fourth age researchers experience time constraints, some of which are imposed and some of which may be self-generated (Mansourian and Ford, 2006). A typical comment about time and multi-tasking came from one interviewee:

“We do not yet have enough time to do research. Besides the high teaching load, the administration is tremendously high”

Mansourian and Ford (2006) also discuss information overload and how this can be both textual overload and outcome overload. Again, typical quotes from our interviewees illustrate this:

“Information overload, so much being published, the need to siphon the good from bad. Now you have to be much much more choosy – that is the biggest challenge facing us all”

“I seem to spend hours trekking through mountains of web resources”
Obviously third and fourth age researchers need to keep abreast of developments and key work that can influence the debate and it is essential that they are able to narrow searches and retrieve data efficiently. Other areas where they told us they would like more guidance included writing grant proposals; interpreting research council policy documents; notification of conferences; and content management.

Ages 5 & 6

During the fifth and sixth ages of their research careers, researchers will have developed research management and project management skills. They will be disseminating research practice, possibly teaching research methods and supervising dissertations/theses. While they may promote good research practice outside of the institution, how far they do so within may vary. One interviewee commented:

“Senior researchers have a responsibility, you have to be selfless and hand over things and not enough researchers will do that”

This reflects comments made by researchers at earlier career stages in respect of the need for a mentor. In the fifth and sixth age of their careers, researchers have more chance to be selective in what elements of research they undertake and what elements they distribute to others in their first, second or third research age. Fifth and sixth age researchers are likely to get funding to employ people to do research on their behalf and, in consequence, information overload may be less problematic for them than for their team members.

Fifth and sixth age researchers may come across the concept of ‘satisficing’ and the risk of missing important information (Mansourian and Ford 2006) especially since they may need access to conference papers and grey literature in addition to journal articles.
Selective dissemination of information (SDI) may serve a purpose here as may quality filters which produce research results in descending order of ‘quality’, meaning that the researcher can impose a ceiling below which they will feel unlikely to have missed anything of the required level of scholarship. However, such filters may be more useful in some disciplines (e.g. medicine) than in others where quality may be a more subjective issue.

On the other hand, partly because they may delegate many of their research activities to earlier age researchers, those in the fifth and sixth ages run the risk of failing to keep up with these developments:

> “Later in my career I did find that my technical skills were falling behind – my coalface skills were being diminished and I didn’t like that. I like to do my own stuff so I did a lot of training”

Not all researchers in these later ages of their learning lives are prepared to admit that they have learning needs, especially relating to information literacy.

**The Seventh Age**

At the seventh age, researchers are invited to give keynote addresses at conferences, are widely published in a variety of media and have external consultancies. Information overload is unlikely to be problematic for them since they have research assistants and personal assistants to undertake searches, and background research for keynote addresses, on their behalf. This does, however, mean that library staff need to be aware of the potential need to train those undertaking the work for seventh agers in effective searching techniques, especially in cases such as the following:

> “My particular areas of specialism is somewhat too specialised and so what is available to me tends to be limited, hard to track down”
These researchers are likely to be doing ‘state of the art’ research, to be institutional figureheads and to have much power and responsibility. It is especially hard for members of this group to admit that they might still have any IL learning needs.

Diverse users, diverse disciplines, diverse needs

One message that emerges from the literature on research and researchers in HEIs is the importance of the culture (Campbell et al. 2003). Stress is laid on the need for supportive environments, access to information and advice and integration of research staff (especially CRS) into institutions. This is where the library and information services staff have a role, especially in relation to induction, skills and information literacy development. Library and information services staff can play a part in making researchers feel more valued and, thereby, better motivated when they receive integrated and formal support and access to information and facilities.

The interviews made the authors aware of the diversity of different user groups (e.g. thanks to widening participation PhD students entering HE have a varied skills base and a variety of prior learning experiences) and communities served by libraries; individual differences (e.g. in the degree of IT literacy; use of e-resources); and the heterogeneity of discipline needs (borne out by the sheer volume of literature devoted to user needs in different disciplines).

As Case (2002) and Wilson (1994) both point out, studies of information seeking behaviour was, from the 1940s to the 1970s, dominated by investigation of scientists and, to some extent, engineers. This has changed since the 1980s with more books and articles covering information seeking behaviour of previously less studied groups and disciplines, e.g. social scientists and humanists. In the 1990s there was an increase in
coverage of health-related information seeking and scientometrics. Interdisciplinarity is a theme which was covered in the late 1990s and early 2000s in work by, for example, Bates (1996), Gerhard (2001), Palmer (1998) Searing (1996) and Westbrook (1997, 2003). With increasing interdisciplinarity it is becoming harder to generalise about habits and preferences exhibited by researchers based on a narrow subject area or specific discipline. The variety and scatter of interdisciplinary resources require a higher level of information seeking knowledge and flexibility.

Increasingly researchers import/export information/techniques/tools across discipline boundaries. Researchers from different backgrounds may be involved in working together to solve problems and library services will be needed to support hybrid research units which bridge national divides.

The interviews also drew to the authors’ attention a mismatch between what the researchers had told us that research was about and what they wanted the library to give them.

“I like open collections where you can browse, especially in collections that are thematically organised…”

“When you walk into the library I like there to be lots of access points – computers easy to find and in your face…”

“I like the atmosphere, the quiet and energetic environment”

“I like the service-minded people”

Some of these issues resurfaced when researchers were asked what would improve their work as a researcher. The three key issues appeared to be open access, full-text articles and staff:

“In my library heaven all stacks are open to visit and there are photocopy machines nearby. In fact it is called the Harvard Medical History Library. Can I live there?”
“What always happens to me is the full text of articles I want is not available...ways of getting books/articles are much easier in the US compared to the situation in Thailand”

It was as if the researchers and librarians were operating in separate silos:

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<th>Research is about</th>
<th>The Library can give me</th>
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<td>• Investigation</td>
<td>• Open access</td>
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<tr>
<td>• Purposeful inquiry</td>
<td>• Electronic resources</td>
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<td>• Gathering evidence/data</td>
<td>• Atmosphere – quiet</td>
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<td>• Confirming or refuting theory</td>
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This sort of polarisation is discussed by Craswell (2007) who tabulates skills training in research areas and sets them against independent skills training programmes. In her case, Craswell is illustrating the debate as to whether skills training should be embedded in research areas or taught separately. It is, as Harvey (2000) points out, not an issue of delivery of skills training but rather one of integrating learning “within a wider responsive context” (Harvey, 2000: 11), which is much more in line with our definition of information literacy as a change in understanding of, and attitude to, the world of information. This similarly emphasises the need for liaisons between graduate school offices, academics and librarians.

**The role of the librarian**

Several of our researchers would like their own personal librarian to do their searching for them and to be ‘on the constant lookout for material for my research’! The RIN study stressed the role of the librarian in provision of expert advice but expressed concern on how far this is taken up. It identified a need for dialogue between librarians and researchers to ensure this expertise is developed and deployed effectively. Librarians
may need to raise their profile, become ‘researchers’ themselves; getting embedded in the research community; gaining credibility; and collaborating as equals. While the RIN study identifies moves in the USA towards the involvement of librarians in research projects, in most cases the librarians’ role is performed within the library context in that they are consulted by researchers rather than proactively going out to – or seeking out - researchers in their subject area. This was very much the case with the researchers to whom we spoke for this project.

**E-information and the librarian’s role**

“*E has changed the way we do research*”

Interviewees were asked how access to e-information had changed the way they worked. Mention was made of access, sharing, time-saving, equity of access issues, alerting services, government information, data collation, the sheer quantity of information available and issues of organising what is found. There is also the concern that research may on occasion be limited to what is ‘easy’, e.g. making do with the abstract or definition from Google when the full text article is unavailable.

“I tend to rely both on Google and search and reference services to find relevant articles…I surf sometimes to Amazon.com, where I can read excerpts from books and decide quickly their relevance”.

“I tend to use specific databases less often and things like Google Scholar more”.

“The Internet is usually my first choice for research, but unless I can get access to full text documents or complete files, I normally use it to get leads to where I can find what I want. I use a variety of online sources…You have to wade through the fluff, but it’s easy to do.”

The RIN study found that many information sources of potential use to researchers were under-used and that researchers’ awareness of new developments in scholarly communication, such as open access, is low. There is a risk that resources not immediately available will be overlooked and unread. As Mansourian and Ford (2006)
indicate people can get entrenched in familiar but inappropriate ways of searching. One key driver for library services identified by the RIN study is direct delivery of more digital content to the researcher’s desktop. This was illustrated in our interviews

“More stuff available more difficult to filter through rubbish vs. quality”

“I waste hours sitting at my desk and I do get diverted. Because there is so much there you get bogged down. There is too much. It’s frightening. People print things out more than they need.”

“When I search in one topic and find something in another “interesting” topic, and the article could be useful in the future, I print it out and save it “in case” I need it. This often ends me printing other articles then I first intended (a waste of time? – the future will tell)”

“When I’m writing papers I focus more attention on the abstract - often that is as far as most people (including me) get with e journals!”

“While searching, I’m mostly looking at the articles that I do have access to, and quite often not even bothering to read the abstracts of the ones that I haven’t got access to, since it would take me couple of days to receive that information anyway. If there’s nothing useful in the accessible ones, Ill turn to the rest. Sad but true…”

Several of these issues raise concerns for librarians but most interviewees, asked if they thought there was a role for formal training by library staff to help researchers use the library and its services, referred to how they learned ‘in the saddle’, learned by doing, through ‘trial and error’, and through working with more experienced colleagues or mentors.

In the past, LIS professionals were more involved with searches as online mediators, who conducted a ‘research interview’ to narrow down search terms to maximise relevance. The growth of the internet has meant that researchers have search engines delivered to their desktop and do not perceive the need for anyone to mediate or refine their research strategy for them. This is corroborated by Thornton and McCracken (2005) in their discussion of the role of knowledge agents who are trained to identify whether the information supplied and sources used meet Boisot’s “Adequacy Test” and trained to
select material to provide the appropriate depth of research needed by the client. As they say, “We have all come across clients who have carried out a “comprehensive literature search”, which has turned out to be a quick delve into the Internet that has barely scratched the surface.” (Thornton & McCracken 2005: 154).

Teaching on information literacy and management is seen by librarians as a core role and 42% of researchers in the RIN study agreed. However there are challenges for libraries in gaining take-up and penetration of such advice and expertise, as well as in distinguishing the difference between true information literacy development and the more usual information skills training. Librarians in the RIN study reported a moderate take-up rate by researchers of formal training programmes in information management. Our survey did not include interviews with librarians but one researcher who had an information science background observed:

> “I do think that there is a role for formal training courses for researchers, but I speak here as one who has run such courses and found that the researchers did not realise that there was more for them to learn”!

The RIN study suggests that training for established researchers may need a sharper focus on the specialist needs and practices of researchers in different disciplines.

One of our interviewees pinpointed the desirability of some sort of training needs analysis:

> “I think it is very important to identify which kind of need different people may have. For some it is a question of acquiring specific skills and for others the need is on a deeper level of understanding …if people have not understood to some degree the conceptual model of a computer then skill-based formal courses will only be a short-sighted help as they will not be able to transfer the skills from one context to another.”
Information Literacy and the seven ages model

An information literate research community has different needs at different stages (over the seven ages of their learning lives); is always progressing in information literacy; and always has something to learn. In general, the “skills” element of information literacy, tends to be higher in early to middle “age”, when researchers have undergone information skills training, but it can reduce again in old “age”. However, a researcher may cross the threshold concept of understanding and changing their attitude to the broader concept of information literacy at any “age” and this understanding, once reached, will never be lost. It is reasonable to expect that a researcher with a truly information literate approach to their research will maintain a higher level of information skills throughout their learning life. An IL research community should include librarians and, like other members, we too have something to learn.

Final thoughts

We leave you with some thoughts and questions. How can library and information staff influence the information literacy development of researchers? In what ways can we
measure changes in attitudes and habits? Can we gather evidence of impact of skills programmes? LIS colleagues report that new researchers are more prone to take up any training on offer, but how is this influenced by organisational culture? We can appeal to the Masters and Doctoral students in that we can offer skills that not only serve their research needs but also transfer across employment sectors for the percentage of higher degree students who intend moving outside of academia, but the link between support for the research project and enhancing employability need to be balanced carefully. Do experienced researchers have the maturity (or to put it another way, are they sufficiently information literate) to recognise that it might be useful to refresh or update their skills? Indeed, can researchers articulate the skills they require? We may know – and our interviews indicate this – that some researchers use ineffective or inappropriate search techniques, but how can we tactfully tell them this? And, after all, we need to be sure that inefficient finding reduces the quality of the results to a significant extent. How can we brand courses or workshops on offer in a subtle manner in order to appeal to this group? Can we help researchers develop more effective ‘satisficing’ approaches? As Mansourian and Ford (2006) ask, what is the extent to which an important component of information literacy is to know when to stop searching? They also highlight the fact that ‘critical searching’ may be necessary to provide the raw materials for critical thinking since the latter, “nurtured on low hanging fruit may be stunted”. (Mansourian and Ford, 2006: 697).

One of our researchers summed up his – and our dilemma –

“It’s challenging finding information. I think we should work more closely with the library – facilitate that linkage. I’m not sure how we change the mindset of people to do that. If I’m struggling would I be able to come and say I need help?”

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