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A New Conception of Information Literacy for the Digital Learning Evironment in Higher Education

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Abstract

The aim of this paper is to explore the problem of how best to conceptualise information literacy in the higher education environment, in order to ensure that any model used is 'fit for purpose' and able to effectively support IL teaching and learning. The nature of this problem was illuminated during consultancy for a UK University in which the author was invited to recommend an appropriate IL framework for student use in a specially designed Virtual Learning Environment. This paper outlines the journey that the author took to gain deeper understanding of the nature of information literacy so that a suitable framework could be recommended. The journey involves consideration of relevant principles of learning, the place of student reflection when learning to be information literate, what IL in higher education (HE) should encompass, the importance of context in developing IL, and the influence of the digital environment, especially Web 2.0. The main features of the most common IL frameworks used in higher education are critiqued. A new IL framework is then offered along with a rationale for its appearance and use. However, it is not presented as an 'answer' or blueprint but to encourage critical reflection on current theory and practice. Finally, the author puts forward some ideas for future research.

Keywords: information literacy; frameworks; learning theory; constructivism; learner context; student reflection; variation theory; Web 2.0 environment

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Introduction

Three years ago a UK university set out to find an appropriate information literacy framework as a key element in its extensively used Virtual Learning Environment (VLE). The framework was to be populated with activities and resources designed by lecturers and librarians and would:

- support students at 'point of need' whilst they were learning and carrying out their assignments supplementing the face-to-face teaching by subject librarians which would continue
- make the most of the digital environment
- be flexible enough to accommodate the demands of evolving disciplines and media.

Along with my colleague David Streatfield (Heale & Streatfield, 2007) I undertook empirical research to determine students' information literacy needs. Key academic and library staff were interviewed, a student on-line survey was conducted, and desk research was undertaken to review frameworks designed for higher education and in common use in the UK. The IL frameworks reviewed included the Sconul Seven Pillars; the Big Blue; the ACRL and ANZIL Standards; Inspiring Learning for All produced by the Museums, Libraries and Archives Council and the definition of IL produced by the Chartered Institute of Library and Information professionals. The language used in each was systematically analysed including the frequency of use of words. The presentation of each framework was noted. In addition, the websites of 30 universities were accessed to see how IL was described and represented on their WebPages.

The data gathered through this empirical work gave substance to concerns about the ways in which information literacy was conceived and presented. These concerns had been growing in the my mind during fifteen years of doing IL research, undertaking development activities across the library sectors and working with academics from different disciplines on teaching and learning in HE. These concerns were about:

- the language of information literacy, particularly its lack of resonance with either academic staff or students
- the single route to best practice usually implied in IL frameworks and in much IL teaching, irrespective of task or discipline;

the way in which traditional IL frameworks were applied in the digital learning environment, without much change in emphasis, despite the evidence from research on the impact of the digital environment and Web 2.0 on student learning and information behaviour (e.g. CIBER, 2008; Veen, 2007).

Criticisms of how information literacy is perceived and presented are not new and some common themes have emerged. An important focal point for rehearsal of this range of criticism was the Information: interactions and impact research conference in Aberdeen (e.g. Kuhlthau, 2007; Limberg, 2007; Williams & Wavell, 2007). Some vital questions raised were whether:

- current approaches to IL were based on coherent and appropriate views of learning
- current conceptions of IL led to librarians focusing too much on elements such as the technical aspects of searching at the expense of building knowledge out of information
- the situated nature of IL practices was fully understood.

These questions and concerns together made it apparent that the frameworks reviewed were not 'fit for purpose'. Could minor amendments be made or was a new conceptualisation of information literacy necessary to meet the learning needs of students in HE? In due course a new framework was developed (Markless & Streatfield, 2007). However, this concrete product is probably the least important outcome of the journey. More important is the process of identifying the fundamental principles that might inform an approach to information literacy in the digital environment, which starts with the student and takes into account influences on their

learning. The search for these principles and a vision of IL that begins to address these questions and concerns form the next sections of this paper.

The Beginning of the Journey: Which Principles of Learning Should Inform our Conception of IL?

Information literacy is an enabler of learning (Todd, 2005); therefore any view of IL needs to relate closely to how students learn. However the literature on learning is complex, sometimes contradictory and emphasises different processes as fundamental. My reading and my experience as an educator and academic developer have led me to adopt a constructivist approach to learning (Bruner, 1968; von Glasersfeld, 1995), a stance supported by many influential writers on information literacy (e.g. Bruce, Edwards & Lupton, 2007; Kuhlthau, Caspari & Maniotes, 2007; Moore, 2005; Todd, 2005). Theories of individual construction emphasise active engagement with, and transformation of, information to achieve changes in individual knowledge structures and the creation of personal meaning. Louise Limberg captured the essence of this when she said that to learn is not to receive information and knowledge but is about changing the relationship between a person and the world (Limberg, 2007). The emphasis is not always on the individual. Principles of social construction are increasingly important for understanding learning in HE, partly due to the rapid expansion of collaborative learning, on-line learning communities and formal mechanisms for peer support. If we accept that knowledge is individually and socially constructed, we need to consider how this view of learning relates to concepts and representations of information literacy.

Some insight into ways of representing material to enable construction was gained through a piece of ongoing research with colleagues in the King's Learning Institute. The purpose of the research is to develop a pedagogy to support students' evolving personal understanding. We have been using a developed form of concept mapping to enable students to show their understanding of a topic. Iterations of the concept map over time enable both student and lecturer to see how understanding is developing and provide students with rich data for reflection (; Hay, 2008; Hay, Kinchin & Lygo-Baker 2008). The early stages of this research made it clear that students find it extremely difficult to learn from chains of information; expertise in any subject can better be represented as a net, with complex connections between different concepts (Kinchin, Cabot & Hay 2008). Students developing expertise need to integrate 'new' information into their existing nets. Information presented as chains, which is the case with many representations of IL, can only be learned and reproduced. This may be acceptable in higher education when students need to learn facts (e.g. anatomy for medicine) but is of little use when trying to influence behaviour and judgement, which is a key purpose of teaching information literacy. Observation of information literacy teaching in the UK and overseas in the course of my work over the past twenty years made it obvious that much IL practice is based on sequential steps. This approach tend to be abetted by the types of IL frameworks mentioned in the introduction that encourage chain learning by presenting what look like lists of skills to learn.

Other related aspects of learning drawn from the works of 'grand theorists' such as Ausubel (1963), Bruner (1968) and Vygotsky (1978) provide more challenges to the creation and use of a pedagogically-sound information literacy framework. These theorists emphasise the need to build on students' prior knowledge and experience; the integral role of reflection and iteration in learning; and the need to provide an overall picture so that students can see where they are in relation to where they need to be. My role as an academic developer in higher education, observing sessions in different disciplines and getting feedback from numerous groups of students, has reinforced my belief in the importance of these principles. I was not prepared to abandon them just because it might be difficult to integrate them into a representation of IL.

The final challenge presented on my journey through learning theory arose from a presentation given to academics at King's College London by the co-director of a large research project in the UK (Entwistle, 2008). This project, which involved group interviews with 700 students, as well as 6,500 questionnaires, was looking at important influences on student learning and understanding and at encouraging teaching for deep conceptual understanding. Noel Entwistle drew on the recent work of Marton (2007) and his own earlier work (Entwistle, 1998) as well as research findings from the current project. He presented a picture of learning in HE that emphasised the need to think critically about:

- the importance of the disciplinary dimension. Entwistle encouraged all lecturers to consider what was distinctive about the subject area they were teaching; how people came to understand in the subject; and what ways of thinking and practising in a subject students are expected to acquire. He posed the question "What does an integrative overview look like?" Lecturers interviewed as part of this research had talked about the importance of teaching how to think in a subject rather than to cover lots of specific content and skills outcomes. If we do not want to view IL as a 'separate subject', we need to link it into different ways of thinking and working in the disciplines; we need broad integrative aims that bring content and process together.

- the importance of discerning the conceptually critical features of a concept or phenomenon and particularly how material is organised to enable students to explore these critical features and variations within them.

- the importance of students' intentions in learning - do they want to understand or to seek meaning, or are they primarily concerned to get the best marks? Students vary their approaches according to their levels of interest, how their work is assessed and how they are taught. We need to consider how to present information literacy to students with such different learning intentions. An in-depth approach to seeking information will have little appeal to the student who is not overly concerned with gaining the full picture. Can any single framework support such disparate needs?

Information literacy does not operate in a vacuum. Students need IL as an enabler of their discipline-based learning and research. Therefore, when considering how to conceptualise and represent IL, it is crucial to examine existing IL models with the theories and principles of learning in mind. Inevitably the elements of learning that I chose reflect my ontological and epistemological positions. However they also reflect prevalent views about what is important in learning as well as recent research into learning in higher education in the UK.

A Milestone Along the Way: Student Reflection

Since at least the 1970s, reflection has been seen as a mainstay of learning and has found its way into many models of learning (e.g. Kolb & Fryer, 1975; Schon, 1983). Reflection is presented as a critical element in developing the processes underpinning learning and is therefore potentially important in any systematic approach to information literacy. Newer approaches to information literacy that are based on such recent theories of learning as variation theory (Bowden & Marton, 1998) are particularly insistent on the central role of reflection. Students need to:

- actively engage in discussion and reflection about finding and using information in order to uncover variation in their conceptions
- confront variation in their own experience and in the experience of others. (Bruce, Edwards & Lupton, 2007)

Adherents of these approaches encourage their students to document their own learning to support reflection. If we agree that reflection has an important part to play in learning to be information literate, we need to consider how to integrate it into any representation of IL. How

might reflection relate to finding and using information? In most models of information literacy, reflection is positioned at the very end of the process or taken for granted. This approach is not likely to enable the development of the meta-cognitive strategies necessary to perform problem-solving with information, particularly when students are working independently on-line.

My research and teaching have shown me the power of reflection in learning. I believe that reflection must be built into any information literacy framework in an inescapable way that underpins the way in which reflection is used. This acknowledgement of reflection might be achieved through some minor addition to an existing IL framework. However, when I pulled together all the elements of learning outlined in this paper it was hard to see how they could be accommodated without some re-conceptualisation of IL. I was certainly left with a number of conundrums that required resolution if I was to reflect my beliefs about learning in a useable IL framework.

The Next Stop on the Journey: What Should Be the Focus of Information Literacy in Higher Education?

Any framework is the result of choices made. It is possible to generate comprehensive lists of the information literacy skills we would like our students to develop. However, if an information literacy framework is to support and enable learning it must be coherent and focussed. Students are unlikely to invest the time to become more skilled across a large number of information literacy capabilities. The frameworks reviewed had all involved decisions about what was likely to make the most difference to student learning and therefore what to emphasise. It was necessary to consider whether these decisions were the most appropriate ones. Did the range of skills and abilities presented in these frameworks make up a coherent and relevant conception of information literacy for HE in the 21st Century?

Recent influential writers on information literacy believe that the emphasis should be on tools for the construction and interpretation of information; the abilities needed in the struggle to understand, frame and solve information problems (e.g. Bruce, 1997; Bruce, Edwards & Lupton, 2007; Moore, 2005; Todd, 2005). According to Carol Kuhlthau (2007), what is important in the 21st century is the ability to use information for problem-solving not the technology of finding. What emerges from this literature is a view of IL that focuses on enhancing students' ability to:

- formulate authentic questions; construct and present their own positions; make sense of the information they obtain; transform it to reflect their own emerging views
- experience and explore variation in finding and using information; develop a set of lenses through which to view a task, a repertoire to draw on
- choose the appropriate approach for the context from the alternatives experienced
- critically monitor and reflect on IL processes in the curriculum.

This is not a conception of information literacy that is found in many IL models. In addition, my own and other people's observation in UK libraries and education institutions over the last twenty years have led me to conclude that IL practice also reflects a much more limited view of information literacy. Too often IL appears to be about:

- libraries and resources
- searching for and accessing information. In addition even if a focus on information seeking is accepted as valid, too much time may be spent on locating rather than on enabling students to formulate authentic questions
- finding the right webpage or information
- technical procedures and tools (that is, doing the right thing in the right order, e.g. how to

access a database) even when working with postgraduates (Streatfield, Allen & Wilson, 2008).

Many commonly used IL frameworks reflect and reinforce this limited vision. I think that in higher education we should stake a wider claim - to the processes underpinning academic practice. Such a shift in focus would entail considering how far information literacy might reach into areas such as critical and creative thinking, structured reflection, active construction of subject knowledge and academic writing. This would entail re-conceptualising IL.

Research into the information behaviour of the 'Google generation' raises other issues about what IL should encompass (CIBER, 2008). We need to consider whether to respond more positively to students' expectations of information and to legitimise elements of their preferred information-related behaviour. For example, we may want to ensure that information literacy frameworks encompass such concepts as 'good enough' information, trial and error, and peer 'expertise' rather than focusing primarily on a set of competencies that appear to be designed to turn all learners into systematic researchers or pseudo-librarians regardless of the context.

Consideration of the reach and focus of information literacy did provide some pointers to what might be included in an IL framework. However it also led me into a potential minefield. Any representation of IL in a framework will oversimplify its complexities and lead to criticisms of what has been included and excluded. Irrespective of this simplification, a framework or model makes concrete our understanding of a phenomenon. We must ensure that the frameworks we use truly represent our understanding of the nature of IL.

The Importance of Context: Against the Generic View of Information Literacy

IL frameworks and models are, by their very nature, generic; designed to be applied across a range of contexts. They present an approach to finding and using information that appears to be transferable. This view of the nature of information literacy flies in the face of a well established research tradition that emphasises the importance of context in relation to information behaviour (e.g. Streatfield & Wilson, 1980; Dervin, 1992; Ingwersen & Jarvelin, 2005; Lloyd, 2005). Context in information-related behaviour is recognised as multi-dimensional; with different facets reflecting features of the task, characteristics of the learner and features of the system. Context affects the way in which searches are conducted and this in turn affects knowledge formation. If we ignore the role of context in developing information literacy in the HE environment we will get trivial learning outcomes.

Louise Limberg observed in a conference presentation that "Influential studies have abandoned the idea of information literacy as a set of generic skills applied anywhere." She saw information literacy as a set of abilities to be used in purposeful ways that relate to task, situation and context; that is, as a social practice (Limberg, 2007). Cultural and social practices in a discipline, including the influence of professional boards, the departmental ethos, and assessment methods, all influence how HE students approach information problems and the strategies they might use to solve them. IL practice will be deeply affected by a number of factors: whether teaching focuses on finding the right answer or on critical thinking; whether learning tasks are contrived, designed solely to satisfy externally imposed assessment and with no other consequences for the student; and whether assignments engage and motivate or encourage reproduction. Without a real and personal interest, students will be satisfied with the superficial answer, the first 'hit', or 'good enough' information. There is no incentive to go beyond using technical skills of collecting and presenting facts.

Even where the broader context supports a considered approach to information literacy, the tasks set may not always require systematic, in-depth responses. Drawing on variation theory, Christine Bruce (2007) invites us to consider some key variation in approaches to searching for information, which she characterises as:

- looking for a needle in a haystack
- finding a way through a maze
- using the tools as a filter
- panning for gold

Kuhlthau (2007) also describes variation, using the terms browsing, cherry picking and differentiating to encompass the same concept.

Students need to understand and experience all these approaches so that they can appreciate what might work best in a particular situation. Variation theory calls into question the provision of any one prescription or sequence of activity; which is what a framework usually provides. Instead, variation theory stresses the importance of having a repertoire of alternatives to draw on, together with the ability to judge when to use a particular approach. These capabilities are the basis of metacognition and underpin effective learning. I believe that a framework that is 'fit for purpose' will provide a tool to enable students to respond to different demands and to support different types of interactions with information. It is questionable whether we should continue to present students with generic IL frameworks, models and processes.

The landscape of this journey is further complicated when we consider the nature of transfer. The traditional view of information literacy was of a body of skills and processes which formed a 'curriculum' to be taught to students and applied by them wherever and whenever necessary. Inherent in this assumption is the notion that, once learnt, a skill or knowledge can readily be applied to any broadly similar new situation. This view was hardly challenged in the early world of information skills although research (Dervin, 1992; Streatfield & Wilson, 1980) on information behaviour in context and on critical thinking skills called into question the whole notion of easy transfer.

Research in the 1980s and 1990s in mainstream education (e.g. Perkins & Salomon, 1992) showed that anything other than 'low road transfer', (which is defined as reflexive, automatic triggering, with little active thought of reproducible skills), is difficult . Researchers at this period were regularly surprised at the extent of similarity it was possible to have between problems, without students realising that they required the same type of solution. What is learnt is learnt in relation to specific contexts; it is not inherently general. This situated learning or cognition has advantages. Students learn about conditions for applying knowledge and skills and see their implications. However, it is then difficult for them to strip away the context and use 'unadulterated' skills for another purpose or task. This requires a mindful, conscious, deliberate search for connections, labelled 'high road transfer', which is not built into many learning situations.

The term 'transferable skills' has unfortunately slipped back into the common academic vocabulary without being underpinned by more research into whether and how transfer occurs. Earlier work has been ignored, as we happily teach a generic set of skills based on a generic IL framework, and talk to students of transfer. I had grave doubts about promoting a framework that encouraged this approach and yet had been asked to recommend one I needed to find an alternative to the traditional approach to square this circle.

A New Road Converges, Bringing Another Set of Considerations: How Does the Digital Environment and Especially Web 2.0 Affect Information Literacy?

The UK university for whom I was doing the consultancy had originally set out to find an appropriate information literacy framework as a key element in its extensively used Virtual Learning Environment (VLE). The assumption underpinning this quest was that supporting learning in the digital environment needed a particular and perhaps new vision of information

literacy. Have traditional views of information literacy really been rendered obsolete? The answer to this question hinges on whether learning in the digital environment requires new skills and abilities and changes in learning behaviour.

When the Worldwide Web was primarily a vehicle for storing and delivering information this was not a contentious issue. Students began to work with larger amounts of information, much of it of questionable quality, but this did not result in fundamental changes to the way they learned. Nor did it lead to strikingly different information behaviour. Existing models of information literacy seemed as relevant to electronic information as to print-based resources. The advent of Web 2.0 has called this position into question.

In my view, learning is not fundamentally different within Web 2.0, nor does the 'new' social software change the basic processes of learning. However it has brought changes that are important in any consideration of information literacy.

Students do appear to interact differently with on-line information (CIBER, 2008). Finding information is less likely to involve systematic information seeking than, for example, using interest groups, peer web pages or social bookmarking. Veen (2007) adds to this list of differences, talking about non-linear learning behaviour; clicking and zapping to deal with information overload and becoming experienced at problem solving at a young age. This all sits uneasily alongside the ordered, systematic and sequential approaches implicit in many IL frameworks.

There is also evidence that many postgraduate and postdoctoral researchers are changing the ways in which they acquire and share research information, including taking advantage of Web 2.0 technologies to 'pre-publish' research papers (Streatfield, Allen & Wilson, 2009)

Web 2.0 is an environment in the course of creation by its participants. The Web 2.0 tools that support this process transfer power, ownership and authority to the participants. These participants individually and collaboratively generate content in a form, format and structure that best suits their own needs and preferences. This content co-creation is conducted in an environment that disregards authority, hierarchy and order, giving voice to the individual and to ever changing groups or communities (Markless & Streatfield, 2009). All this inevitably gives people license to design their own routes through learning tasks in any way that suits them. Any contemporary approach to information literacy must consider how to engage more effectively with learners by understanding these multiple aspects of how they can learn and share information.

Some researchers (e.g. Oblinger & Oblinger, 2005) have forecast that the next generation of students entering higher education will be digitally literate, highly Internet-familiar, connected via networked media, conditioned to expect immediate responses, and will prefer experiential learning. It is expected that this generation will be highly social: they will prefer to work in teams and will crave interactivity in image-rich environments as distinct from text-intensive environments. It can be difficult to reconcile these developments with many traditional IL frameworks which rely on laborious sequential steps and hardly refer to collaboration or to multi-media resources.

Taken together, these changes pose real challenges to how information literacy is presented. We may already conceptualise information literacy in ways that can accommodate the effects of Web 2.0. However this is not readily apparent when looking at many of the IL frameworks used in higher education.

More Uphill Travelling: Problems with Commonly Used IL Frameworks

The journey so far had presented numerous challenges, all seeming to cast doubt on the validity

of information literacy frameworks. Detailed consideration of frameworks like the Sconul Seven Pillars; the Big Blue; the ACRL and ANZIL Standards; Inspiring Learning for All produced by the Museums, Libraries and Archives Council and the definition of IL produced by the Chartered Institute of Library and Information professionals, all commonly used in higher education in the UK did nothing to make the journey more comfortable.

'Literacy' is a problematic and contested concept. It has been variously described as encompassing notions of: functional competence and skills; sets of wider cognitive abilities; or a contextualised approach to learning in its social and economic context (Bawden, 2001). However, once formalised into a framework, information literacy is usually reduced to a series of skills, procedures and technicalities.

Most of the reviewed frameworks do not include many of the elements now thought to be fundamental to information literacy. For example, use of information is reduced to determining relevance and extracting pertinent items of information by taking notes or resorting to 'cut and paste'. The words 'knowledge', 'understanding' and 'making sense of' seldom occur, nor does the idea of creating one's own viewpoint. The apparent assumptions are that this shortcoming will be addressed in the subject teaching or that the acts of extracting and organising relevant information will themselves stimulate the construction of meaning.

If we accept that constructivist principles are the most appropriate to inform and guide information literacy teaching and learning, students will be required to develop a repertoire of strategies that underpin the constructivist approach. These include:

- reflection: the ability to reflect constructively and to use that reflection in planning for their own development
- monitoring and evaluation of the processes undertaken as well as of the products of their study
- making sense (deep understanding) of the information that they obtain, linked to the ability to transform the information to reflect their own emerging views.

Meta-cognitive strategies are taken for granted in most models of information literacy, placed at the very end of the process, or referred to in accompanying commentaries. However, these aspects of learning cannot simply be grafted onto existing frameworks or inserted after a particular element of a linear model. They are part of an iterative process of learning not well represented in existing information literacy frameworks.

Most of the commonly used frameworks are presented as a series of logical steps; the route to information literacy as a linear, rational and systematic process. The sequential view of skills deployment has long been questioned. Observations of pupils from 5-18 in schools and of students in further education colleges show that they seldom follow the prescribed sequence (Moore, 1997; Markless & Streatfield, 2000). Formal studies of information-seeking behaviour in universities again challenge this premise (Foster, 2006). The information environment of Web 2.0, which has been variously described as anarchic, disregarding hierarchy and order, and increasingly user-constructed, makes the sequential approach to information literacy seem even more untenable. And this is before we look at the nature of much learning which includes iteration, trial-and-error and choice. Yet "the desire to inflict sequences on students is remarkably resilient in the world of information literacy. Even writers who are responding to the Web 2.0 environment tend to present a sequence of processes to be learnt in order to become 'information fluent (e.g. the five-stage process of Jukes, 2007)" (Markless & Streatfield, forthcoming).

Traditional frameworks are usually accompanied by some form of caveat recognising or even advising that it is not necessary to follow the prescribed sequence. However, there is little help offered on how to use the model in a non-sequential way. When students are working

independently and using an IL framework for support how should they approach it? Can a step be missed out? What might the consequences be? If a student is unsuccessful at one stage, do they have to start again?

Inevitably IL frameworks are generic, offering a list of discreet skills and abilities to be taught or applied irrespective of context. They portray some disconnected idealised approach to information seeking and use. We seem to expect students to work in a rational, systematic, linear manner irrespective of the task, of the discipline, of their existing knowledge, or of their cognitive style. The problems inherent in adopting such a generic framework for teaching information literacy have already been discussed.

My review of commonly used IL frameworks made me concerned about the vision of information literacy that was being promoted across universities. I wondered how relevant it appeared to academic colleagues and how comfortably it fitted in with new developments in teaching and learning. I was also concerned about how information literacy teaching was affected by the organisation implicit in the frameworks

An Interim Destination: The Production of a New Framework

Reflecting on what had been uncovered during the journey led me to wonder whether any framework could be valid, since it was unlikely to incorporate all the issues and concepts that now appeared to be fundamental. However, staff and students in many further and higher education institutions want some sort of framework. They want a public statement that clarifies what is encompassed by information literacy; a guide to support curriculum planning; and something that students can refer to when doing research and tackling academic tasks. And the university paying for the consultancy wanted a concrete outcome to underpin their virtual learning environment.

The solution offered was essentially a framework (Markless and Streatfield, 2007) to support student choice in learning rather than information literacy teaching. Some of the individual elements of the framework hark back to those designed in the 1980s and 90s. The skills and strategies included are not all new but the emphasis has changed. There is not a heavy emphasis on systematic searching; students are encouraged to think in terms of forming their own perspectives and presenting their own authentic voices; the idea of transforming information to support the construction of knowledge has been introduced. The language used is not as library-focused as in many frameworks. It tries to reflect aspects of learning. It is not just the content of the framework that has evolved; it was designed to be used differently from traditional frameworks. The drivers behind the approach are student choice and reflection to support effective learning rather than laying out a sequence of steps to be taught. Students with different approaches to information seeking and use, as well as to learning itself, should find the framework more inclusive.

During three key stages (which do tend towards the sequential) students choose which strategy to adopt at different points in their research. Each of the key elements is backed up with help and guidance. Importantly, if one avenue fails students can go back to the big picture and choose another route; they are not trapped in a sequence that they are expected to follow. Trial and error, often an important if messy part of learning, has been built in. The framework is designed for students to construct their own problem-solving approaches to finding and using information, either individually or collaboratively. The impact of context on learning should lead students to make different choices about which strategies to employ in which order and which skills to draw on depending upon the nature of their current task and the wider social context in which they are operating. The framework takes advantage of technological developments that allow individuals to make choices, navigate between options and then save their search paths as a basis for future reflection.

The framework draws on two research-based published models, a non-linear model of information-seeking behaviour devised by Allen Foster (2006) and a model of information and critical literacies offered by Ross Todd (2001). Foster (2006) worked with academics to show the fallacies inherent in the assumption that researchers looked for information using a fixed sequence of steps. The idea of a non-sequential approach was stimulated by reading his work. In addition some of the elements in figure two are taken from his model of information seeking. Todd's overview of information literacy emphasised transformation and construction of knowledge because he wanted to encourage students to stop interpreting research tasks or assignments merely as processes of collecting information. He heavily influenced the content of figures one and three.

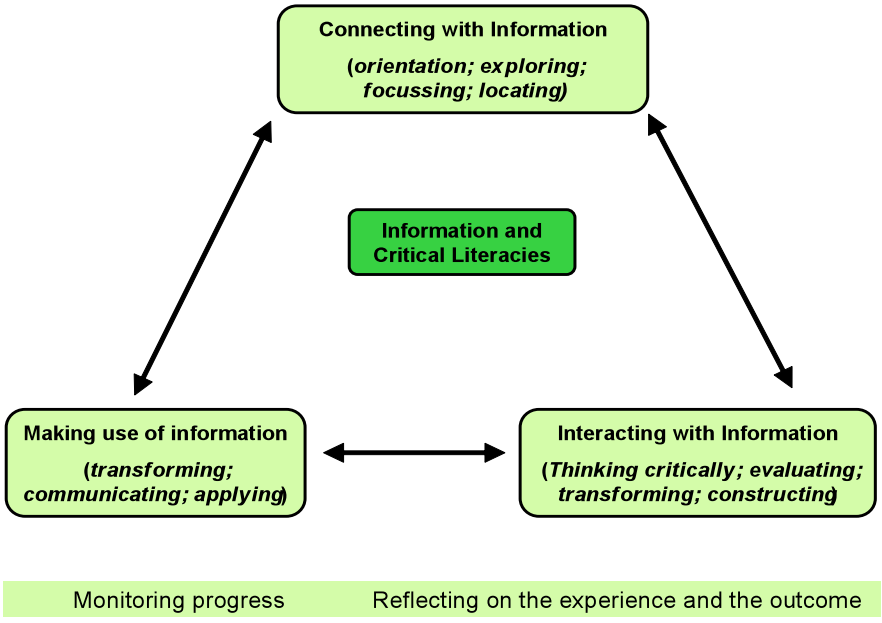

Figure 1. Information and critical literacies (Markless & Streatfield, 2007, p. 29)

Figure 1 provides students with an overview of what is involved with finding and using information. Some sequencing was unavoidable but was kept to a minimum. Students choose to engage in any one of the three main elements depending on the nature of the academic task they are tackling.

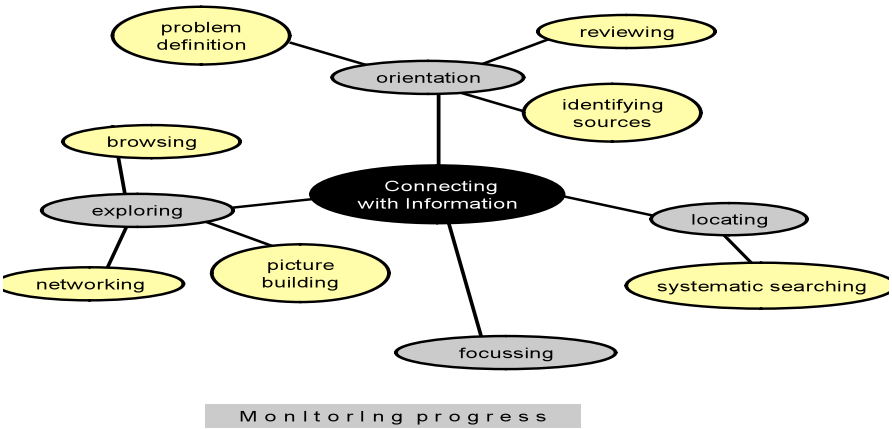

Figure 2. Connecting with information (Markless & Streatfield, 2007, p. 30)

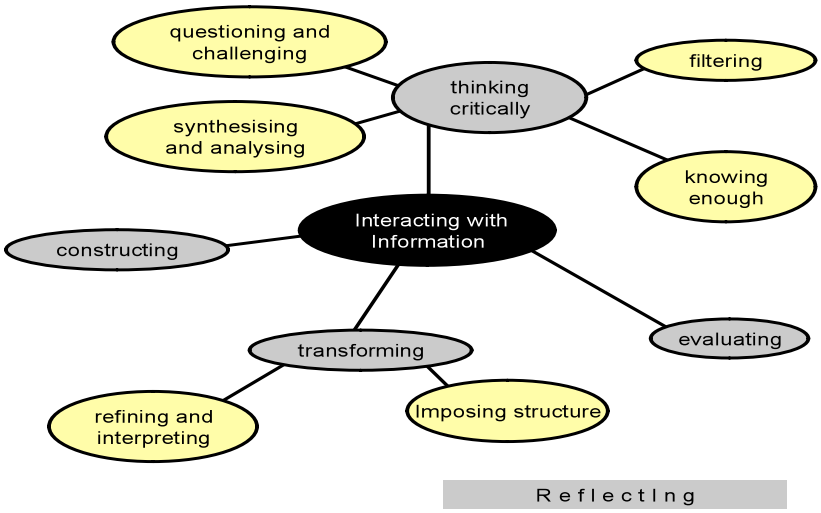

Figure 3. Interacting with information (Markless and Streatfield, 2007, p. 31)

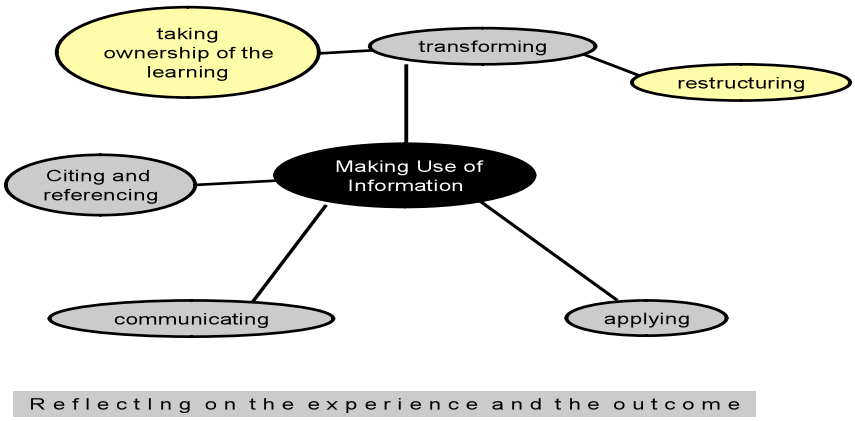

Figure 4. Making use of information (Markless & Streatfield, 2007, p. 32)

Figures 2, 3 and 4 are what the students see when they click on the relevant box in figure 1. There is no set path through any of these figures; if the student is at the beginning of a project they may look at figure 2 and decide that the best place to begin is with networking. If they click on networking they will get some ideas about who they might contact and how they might work with peers. Equally, a student might decide to begin with problem definition. Again, this element is populated with activities, ideas and advice about how to analyse a problem.

Whatever the path a student or group of students decides to take through this framework, they are offered on-line support at the point of need. They are also encouraged to 'save' their path so that they can see the choices that they made when they worked through a particular assignment. Students are encouraged to compare their chosen paths with those of their peers and consider which have been most effective. They can also review their approaches across a number of different tasks to see whether and how they have adapted their approach to the context. Encouraging reflection on the process of learning was an important element in the design of a non-sequential framework.

Onwards and Upwards? Using the Framework to Support Learning

For the framework to provide the timely help that students need, it has to be populated with

- High quality, authentic tasks drawing academic work-content and process together (e.g. conduct a critical evaluation of sources to construct a position for an essay, rather than tasks on 'how to evaluate information')
- Activities that enable students to make their current information strategies and skills transparent so that they can be discussed and reflected upon as a basis for development
- Activities that are based on the principles of constructivism, requiring a high level of intellectual engagement from the students.

Two rounds of formal evaluation have since been undertaken. Groups of students from a wide range of disciplines were observed using elements of the framework. They were asked to note down answers to a series of open questions whilst interacting with the framework. A facilitated discussion then took place. The feedback from the evaluations has been very positive. Changes in page design and in some of the support activities were recommended, but nothing more fundamental.

We were lucky in this consultancy because the framework was intended to be applied university-wide rather than just adopted by the library. This ensured that one important dimension was addressed when applying the framework, collaboration between library staff and lecturers. For this type of information literacy framework to be effectively embedded into HE teaching and learning requires

- Active collaboration between academic staff and library managers
- Building of on-line links to different topics and assignments
- Electronic capture of the choices that students make in different contexts and support for reflection on those choices.

Teaching and tutoring is still an important element in IL support when such a framework is employed, but it is now focussed on exploring the repertoire of information literacy, on formulating questions, and on discussion and analysis of choices.

Conclusion: The Journey so Far

This framework is very much a work in progress. It attempts to incorporate some important principles of learning as well as research on the influence of context on information behaviour. The changes being brought about by the advent of Web 2.0 have also been taken into account in this development work. Any framework will be flawed because it cannot fully take account of the influences on information use or the problems inherent in producing any generic view of information literacy. Undoubtedly changes will be made in the light of further developments in the digital learning environment and growing knowledge from research into how students come to understand in 'their' subject.

To reiterate the point made earlier, in some ways the new framework is the least important outcome of this journey. What seems to matter more is how the framework and its underpinning principles can contribute to a discourse on information literacy in higher education. If presenting the framework and the ideas that it tries to encapsulate can arouse controversy, encourage people to dig below current practice, or stimulate change, it will have achieved something positive. To support this process more research is needed with students using the framework in different settings. We need to ascertain whether the language used is appropriate across disciplines and in different institutional contexts; what pathways students construct through the framework and how these differ; and how to use the framework most effectively to encourage student reflection and to broaden their range of IL strategies.

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