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Mobile information literacy: a preliminary outline of information behaviour in a mobile environment

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Abstract

The purpose of this paper is to examine the idea that information searching and use may vary with the widespread use of internet capable mobile devices.

It highlights areas of existing literature that report variation in information searching and use on mobile devices, in addition to reporting on the results of a small set of semi-structured interviews. This was a small qualitative study, interviewing five experienced and confident users of mobile devices, which will not show the full range of mobile behaviour in seeking for and using information on the move.

It gives a starting point to consider how information behaviour may change between mobile and fixed environments.

Keywords

information literacy; transliteracies; mobile literacy; mlearning; mobile learning

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1. Introduction

The early days of information literacy (IL) included a lot of discussion on broad, inclusive definitions of what IL means, starting with the earliest use of the phrase in the early 1970s by Paul Zurkowski (then president of the Information Industry Association). Carbo (1997 p.395) quotes Zurkowski as saying: “people trained in the application of information resources to their work can be called information literates. They have learned techniques and skills for using the wide range of information tools as well as primary sources in molding information solutions to their problems.”

These early broad definitions set the scene for how we still think of IL now. However, they suffered from a lack of hard measures and firm attributes against which the skillsets of people could be measured. There is a natural desire to take the concept of IL and want to measure people (often students) against it.

There have been various attempts to turn the definitions and general ideas of IL into formal models and standards. Though some models focus on the problem solving or research process rather than IL, most of the IL models and standards can be split into two categories.

The first, and dominant, category is exemplified by the Association of College and Research Libraries’ standards (ACRL 2000) along with several other standards based upon them; the SCONUL Seven Pillars Model (SCONUL Task Force on Information Skills 1999 & updated in 2011); and the Big Blue model (JISC 2002). All of these describe the characteristics or attributes of the information literate person. They may have levels built into or added onto them, but essentially

they describe the requirements one must meet to be described as information literate according to each model. They all derive from similar definitions and are in effect based on the opinions of a group of selected experts. There is therefore a great deal of overlap between the different models and standards. Much of the original investigation was carried out in the early 1990s, which also places the ideas within the context of a pre-world wide web, pre-mobile world, with any adaptations to take into account the changing context bolted on to existing ideas and models.

Although some are described as standards and some as models, they would be best classed as standards. Rather than modelling actual behaviour, they describe the attributes of the ideal information literate person and imply it that it is relatively easy to work out who is information literate. The models or standards apply primarily to higher education, but they suggest that if you measure a student against their lists of attributes, you will produce a score of how information literate that student is, regardless of the range of contexts that person will operate in.

The second category of IL models is most clearly shown in the research carried out in Australia. Christine Bruce (1997) developed her own model of IL, the “seven faces”, as the first relational model. It reflects how people experience finding and using information in their own way and as such is very different to the lists of characteristics or attributes described by the competency-based standards and models. It is significant that the relational models take the experiences of users to their core, as opposed to the competency- based models above that are based around the opinions and experiences of experts. They seek to model the richness of real behaviour rather than describe the ideal information literate person as perceived by experts.

This idea of IL depending on the person and their current context has been taken up and developed by many researchers since (including Edwards 2006; Boon, Johnson and Webber 2007; Williams 2007, Bruce and Hughes 2010).

From these relational models, it can be seen that a simple list of attributes is insufficient to measure whether one is information literate. The concept of IL means subtly different things depending on the process you are undertaking or the context in which you are operating.

The recent revision of the Seven Pillars Model (SCONUL 2011) recognises this distinction and creates a core model with the aspiration for different lenses to be created using the core as a basis. However, at heart it is still presented in the manner of a set of standards that describes the attributes of an information literate person.

Beetham et al, in their Learning Literacies in a Digital Age (LLiDA) report, reinforce the idea that taking only a competency-based view is insufficient, stating that it is wrong to “imply a single model of digital competence rather than the multiple modes of engagement, varieties of digital scholarship, and numerous specialist applications, which characterise the academic experience” (2009 p. 67).

This study, therefore, seeks to explore how information use and IL can vary in an environment where mobile devices provide quick and easy access to information on the move. It uses existing literature and a small initial study to describe some areas where our ideas of IL may need to be extended to incorporate the reality of easy mobile access to information.

2. Explosion of mobile internet use

The near ubiquitous nature of mobile phones, combined with Wi-Fi hotspots and 3G networks (and increasing numbers of 4G LTE networks), allowing fast and easy access to the internet from handheld devices, has meant an explosion in mobile internet use. The Pew Mobile Access 2010 report (Smith 2010) found that in early 2010 almost two-thirds (59%) of American adults go online

wirelessly. This included 40% of American adults accessing the internet from a mobile phone. If there is any doubt that this figure is increasing, the same report also highlights that in the 18-25 year old age group, 65% of people in their study accessed the internet from their mobile phone. This message is reinforced by the ECAR study of United States (US) students (Smith and Caruso 2010), which found that 63% of students surveyed owned an internet capable handheld device. About half (43%) of these used the internet from their device daily (up from 29% in 2009). Smartphone ownership is continuing to increase from the level in these studies, with 46% of American adults owning one in February 2012, up from 35% nine months previously (Smith 2012). So increasingly it is the norm to access the internet from small, mobile, handheld devices and to do so regularly, as a normal part of daily life.

It is more likely than ever that a new mobile phone will be capable of accessing the internet. Indeed, it is forecast by Nielsenwire that by the end of 2011 more smartphones will be sold in the US than standard mobile phones (Entner 2010). However, as the phrase "internet capable handheld device" suggests, phones are not alone in providing internet access on the move. Most handheld games devices (for example, Nintendo DS, Apple iPod Touch, Sony PSP) include Wi-Fi access to the internet, as do netbooks and tablets, with tablet computers such as the iPad from Apple having the option of inbuilt 3G connectivity through the mobile phone networks.

3. Areas of variation between fixed IL and mobile IL from the literature

The use of a variety of handheld devices to search for and use information on the move, moves us further away from the comprehensive competency-based approach of the dominant IL models.

The frame or lens which we would need to make sense of IL within a mobile context is different to a lens that would fit a fixed environment. To get useful knowledge about how people act in the mobile environment, we need to consider the unique nature of satisfying information needs on the move.

Based on the existing literature, there are four key areas in which mobile IL would vary from traditional "fixed" views of IL:

	Fixed information searching	**Mobile information searching**
Where?	Largely in "set" places. At a desktop computer (with little variation in software); at a fixed workplace; within a library.	Anywhere. Any mobile device (phone, games console, e-book reader – massive variety of devices).
What?	Anything and everything.	Normally quick information, often context- or location-specific.
How?	Range of established tools to access and manage wide range of information sources. Standard search engines.	Often narrow apps and individual specialist sites rather than open web.

Time spent?	Varies. Often slow, long access. People spending long periods searching for, organising and extracting information, especially for academic use.	Quick / fast only. Shorter searches. Little pondering and extracting information. Favour short chunks of information. Convenience of device.

3.1 Where it is manifested

A diary study of mobile information needs found that over 67% of information needs were generated when the user was mobile, that is *"*away from their desk, commuting, traveling abroad, or on-the-go" (Church and Smyth 2009, p. 251). The quantity and penetration of mobile internet capable devices mean that these people can increasingly attempt to meet these needs when they occur. Indeed, Hemoinen (2009) found that amongst already active mobile internet users, virtually all of these "on the move" types of information needs were addressed through mobile devices as they occurred (145 out of 147 information needs). The only failure to address a need in this study was due to a mobile phone battery running out.

Mobile search can and does happen anywhere from a range of devices with massive variation in functionality. Mobile search can happen from practically any mobile device that includes the ability to connect to the internet. People now search for information from mobile phones, PDAs (Personal Digital Assistants), handheld games devices, e-book readers, tablets (touchscreen portable computers), netbooks, laptops and more. This can happen anywhere with a mobile phone or access to wireless internet. Search no longer happens in fixed, controlled environments, but in random, messy, uncontrolled ones, from crowded public transport on the way to work, to the loneliness of Mount Everest.

3.2 What searches are carried out

Mobile information needs are dominated by the desire for quick, often context-specific information particularly regarding local services, travel and trivia (Church & Smyth 2009 and Heimonen 2009). When searching and using information in a fixed, traditional location, users search for a broad range of information, but this isn't the case for mobile use. The searches users carry out on a mobile device are much more likely to be an additional activity rather than the sole focus of their attention. Users are therefore influenced by the primary activity they are also engaged in, in other words, the context in which they find themselves (Hinze et al 2010).

The types of information that users seek on the move are often factual, small elements of information. People look for the time of the next train, the way to the station or perhaps the closest place to eat while they are waiting, not for discussions on train reliability, the reasons why a train station is located there or the place of takeaway cuisine in our cultural heritage. There is likely to be limited evaluation of the information they find, and little opportunity to take detailed information away and derive new knowledge from it. Detailed information is to be avoided as it is hard to read on the small screens, or too time consuming to look at in this context.

3.3 How users search

Using a fixed, fully featured computer allows access to a wide range of established tools and information sources. It is typical to start searching for information with a generic search engine, which may then lead onto more specialist sites or search tools. Searching from a fixed location

such as a desktop personal computer could be characterised by the breadth of sources and tools available and used.

Mobile search, however, is heavily influenced by the natural constraints of using a device with a small screen, a small or virtual keyboard and may be characterised by narrowness of sources used. Mobile phone users are often encouraged to access the web through their mobile networks' own portals, which were until recently the most visited mobile websites (Church & Smyth 2009), and through that access only a small part of the mobile web.

Nearly 40% of mobile users also go direct to a known URL, with less than 10% starting with a search engine (Fusco 2010). Average search query length on a mobile search engine also tends to be shorter than when using a desktop computer (Kamvar et al 2009). Kamvar et al.also believe that mobile users search for more context- or location-specific information than fixed users (2009, p.804).

3.4 Time spent on searching

Kamvar et al (2009 p.805) found people spent less time refining searches on mobile phones, with 1.94 queries per search session on a desktop and 1.70 from a typical mobile. There is less patience when searching from a mobile device, with the desire for quick and easy searches dominating.

In Hemoinen's study (2009), it was found that 35% of information needs occurred in the home. Even though a fixed computer (or laptop) may have been available, the speed, proximity and convenience of using a mobile device trumped the more powerful device.

It can be said that people turn to their mobile devices for quick and dirty searches for information. They want to know something, and they want to know it as quickly as possible.

4. Details of the study

During March and April 2011, five semi-structured interviews were carried out. The subjects were computing or information professionals selected as experienced and confident users of handheld devices that could connect to the internet. They all worked in positions that required them to search, evaluate and use a range of information to support their work. In addition, they owned and regularly used mobile devices for both work and social reasons, using these devices in a range of different contexts. This group of interviewees could be described as more experienced and confident users than is currently typical of the average user. This was intended to give a rich overview of possible ways that the average user may experience connecting to information on the move, within the constraints of a small exploratory study.

A small number of questions were prepared to cover the differences in mobile and desktop searching for, accessing, using and evaluating information, based around the Where, What, How and Time spent aspects outlined above. Considerable freedom was also allowed to discuss topics of interest as they arose.

Interviews (amounting to 3 hours and 45 minutes) were all recorded and transcribed. The resulting transcripts were examined for any mention of needing, searching, evaluating or using information (in other words, mentions of core IL ideas) and all resulting mentions were coded using a grounded theory approach. Essentially codes were generated according to categories that emerged from the reading and re-reading of the transcripts, so with only the initial filter of comments relating directly to standard general definitions (not existing models) of IL.

Coded responses from the transcripts were then grouped into emerging themes, as described below.

5. Modes of information engagement on the move

Three key areas emerged from the transcript analysis:

- How people search for and evaluate information on the move
(including “Searching for information is quick and easy”; “Information needs are contextual”; and “Searching can be social”).
- How people use information and create new knowledge on the move
(including “Our memory can be outsourced”; and “Mobile internet acting as a bridge between devices”).
- How people coped with the ’always on’ nature of mobile information
(“Information is constantly pushed at us”).

These are illustrated below using quotations from the interviews, together with the major sub-themes identified.

5.1 How people search for and evaluate information on the move

Searching for information is quick and easy

A strong and consistent idea that emerged was that searching for information from a mobile device was seen as quick and easy, reflecting the results from the existing literature.

'The search is so quick. And if I put the right keywords in it generally brings up what I want straightaway.'

Interviewees were much more likely to quickly search for information that they may otherwise have done without in the past. Asked about how their behaviour had changed since using a mobile device to access information, interviewees came out with statements such as:

'I think I'm much more likely to hop on when I'm out and about than make a guess.'

'I’m more likely to – whatever time of day or night – look for something on a whim. I’m more flighty probably.'

This quick and easy idea of searching strongly affects the way people search for information, even down to the search tool used. It was rare amongst participants to use the specialised Google app (mobile search application), despite this being praised in some interviews. The desire for the search itself to be as fast and as easy as possible means that the search tool (when used) tended to be the default built into the mobile browser used.

'For general information, quite often, I go to Google, because, it’s there, it’s in your search bar in mobile Safari.'

'Purely as a convenience thing, I fire up mobile Safari and bang into the Google bar. I've got the Google app as well, but, I tend not to use it.'

The nature of the information sought is quite narrow, again due to the desire for searches to be quick and easy. Rather than search for anything and everything, short facts were sought instead. Searches were unlikely to be speculative, but more often seeking out information that the searchers knew existed somewhere.

'If it's just a simple, you know, "what's the capital of this that and the other", I'll go straight to the phone, because it's a quick result with an unambiguous answer...'

'More often than not I'll search for it if I know it's there.... Last night there was a voice I thought I recognised on the radio and I walked out the room and xxxx said to me five minutes later, "That was the actor Chris Emmett" and so I went to the IMDb app and searched for him to find out what else he'd been in, because the voice sounded really familiar and I was like, "It must somebody I've heard from somewhere else." So I knew that was the place that I was going to be able to get that information.'

'I've started singing songs to the kids at bedtime ... Last night they wanted a new song, so I decided I'd try I Ain't Marching Anymore by Phil Ochs. So I just searched on Google to find the lyrics to that so I could sing them that with actually the lyrics in my hand so I knew what it was I was singing.'

Any speculative information, information that needed reading in depth, or information that required further analysis was generally avoided. This was often the point where interviewees would leave their mobile device and seek out alternative ways of searching.

'Quick and dirty searches I'll use the phone or, if it's on, the laptop next to me, but anything more in depth, or anything involving a lot of sitting down and typing, that'll be up in the study.'

'We booked a holiday to America, so I needed quite a bit of research. The stuff that I do on here, if I do any, would be to complement it in one sense. Like if I'm looking at car hire and stuff I'd feel like, doing a big transaction like that, I don't think I'd do that on a mobile at all, because I just wouldn't… I don't know; confidence in it.'

'So ... if it's something that's going to be a quick answer, I know I'm going to get a trusted response for or something immediately verifiable, that's when I use this [indicates phone]*. If I'm going to have to look at multiple search results and analyse them and judge their quality ... if I'm going to have to browse through a whole load of content files until I get to something, where say there is a forum where a question I may be looking for is answered, or there is a trusted source, then I'll immediately go to a desktop machine...'*

This reluctance to spend time evaluating the information brought back via mobile searching means that assessment of the quality of information is shifted back in the process. Instead of evaluating information as it is found, there is a narrowing of the sources used initially. The quality checking is about only going to trusted, previously known sources, whether dedicated apps or websites, rather than general searching.

'...where I've got something that's trusted like, I know, if it's movie information, it's IMDB is the canonical, kind of, accepted authority. For programming problems I'll go to stack overflow or something like that, whereas you used to go to experts exchange, you've got things like stack overflow which have got a big community around them and people who know what they are doing. So it's got good word of mouth among the developer community. So, yeh, there are trusted places I go...'

'They are sites I was familiar with before I added them, so they were sites that I suppose I trusted and I thought the quality was good before I put them in ... So yes, they're things that I knew from browsing on a PC I found them, 'cos I think it's easier, yeah, it's easier to become, or I've become familiar with them on the PC first and then ... moved to the phone. So I've sort of brought all my favourite sites across and so yes, quality wise I thought they were good enough and I trusted them before they made my list on there.'

Information needs are contextual

In addition to the sort of information searched for from mobile devices generally being quick and easy facts, there was a strong relationship found between context and searching. Searches tended to be about the environment around the searcher and heavily influenced by the primary activities they were carrying out. Searches tended to be based on information needs being generated on the move and immediately met, which the interviewees may have been likely to manage without in the past. They may use also the GPS functionality built into many devices, relying on location aware services to filter their searches for them. When searching for information that relies on location aware services, there were no concerns expressed that this could exclude relevant results.

'...quite often I find location specific information I'll search for a lot more now. So when I'm out and about I'll use, erm, something like the Around Me app, or something like that to get local information.'

'There was one time I was looking for a lawn mower and I was in B&Q and I saw the one I wanted, it was £40 or whatever it was, and it was just after I got my phone, so I thought oh I'll try it so I went on, Googled it, it turns out it was £5 cheaper in ASDA which was 200 yards away so I went and bought it from ASDA.'

'I've found out that if you're going somewhere you can type in car parking in say Leeds or wherever and you go to Leeds Council website and they have a list of all the car parks and the prices etc and then you can download PDFs to your phone because it's got a PDF viewer built in you've got it there.'

'...in the past you would go to a bus stop and you'd have to look up the information when you get there, well you don't need to do that now, if you're somewhere you can find it out, if you're out and about and you need to get somewhere you can look it up before you go there, You can look up cinema times while you're out. If you're out for a day you can just.... I don't know, you can just think well what's in the area, you'll type it in, it's there, you've got the information, anything you need to find out. '

'I've got live departure boards as my third bookmark...'

Searching can be social

Social networks are heavily used on mobile devices, particularly Facebook, not just to keep in touch with friends and colleagues on the move, but as a valued source of information. Interestingly in this study, social networks tended not to be a place to actively ask experts for information, but were valued because they know the user's preferences and "push" valuable information in their direction.

'I definitely use social networks more for a source of information.'

'A lot of my friends are posting news stories .... so I'm using my social network as a way of getting news. I'm a consumer rather than a producer.'

'Since I got on Facebook I've signed up to local venues that have live bands and like the council does the, what is it, the food festival and things like that, you sign up for all these things and they give you information about it. And these are things that in the past I would not have known about and they're always the kind of thing that you hear about afterwards and you think, oh, I wish I'd known because they weren't publicised well enough, but now because of Facebook I can sign up for them and get the information sent to me and go to these events which is a lot different from how it used to be.'

5.2 How people use information and create new knowledge on the move

Our memory can be outsourced

Consistently across all interviewees, their mobile devices acted as a way of carrying information around with them they may otherwise have needed to remember. Access to calendar information, staff directories and the ability to take notes around on one small device were all seen as incredibly valuable by all. One participant claimed directly that it freed up space in their head to think critically about things – they no longer needed to remember facts, they could instead concentrate on more important things.

'...it has become like an outboard brain for me, you know, and it in a way is kind of an extension of me. It is interesting that having something like this will allow you to kind of delegate remembering facts and free you up for kind of critical thinking. ... I organise everything through it, you know, I access all my email through it, I use it to keep up with my work here, I synch up with my work calendar, my personal Google calendar, to schedule everything, I keep recipe notes on it and things like that, it's just all .. it's everything. Everything that I, that is my personal information that I use on a daily basis is either on this or accessible from it.'

'The uni app; I use that. I've got that and I use that. I use that mainly to find out where somebody is in a building ... you could wander round for ages going, "I'm looking for such and such's office. They're in this building somewhere but I don't know where." So at least the directory will give you a room number, which will get you in the right general direction, and sometimes, if I'm walking across campus and I just need to phone somebody and I can't remember their extension number I'll use it for that as well.'

'Any file attachments that I open from emails I always open in something so I've got a version of it saved. Obviously at some stage the phone will be full up of stuff and I'll have to do something about getting rid of some of the documents, but for now it seems to be fine.'

'I know yesterday when I got to the student panel early or something and people are sort of setting things up, I just make sure I was on the Wi-Fi there and then I actually put my agenda up for the Course Committee yesterday, because I didn't want to print everything off. So I just had the agenda just roughly through there.'

Mobile internet acting as a bridge between devices

Information doesn't stay on the device it may have originally been found on. This study found that people were confident in moving information to the device they want access to it on. They see all their devices as being connected and are happy transferring information between devices.

'Dropbox has been a real, it's changed the way I've done things a lot in terms of the whole, the whole seamless synching that Dropbox does...they have just made it a folder that you keep your stuff in and didn't put all this cruft around it, no workflow or anything like that, just a folder that keeps your stuff in and you can access it from anywhere'

'I've actually started using a photograph at work where, you know, there's an error message on screen. And I photographed it, pushed it to my work email and then sent it to staff IT or something. Student IT. And that's proved quite useful.'

'I have a file browser ... this also allows me to see the folders on my home computer over wifi and copy them across to the phone wirelessly which is great.'

'That app there allows me to control my computer at home, so only on Wi-Fi again but if I'm laying in bed and say I've finished watching something that's streaming I can then log into that, it logs into my computer and the computer desktop appears on this screen and then I can scroll around and I

can shut the computer down, I can start programmes or whatever remotely .... So it's a remote desktop client and then I have another one that allows me to control the computer mouse from the screen over Wi-Fi and another one that allows me to stream music from my computer to the phone.'

This ability to transfer between devices has meant that some interviewees were happy differentiating between which devices they want to access information from, regardless of where the search was carried out. So sometimes searches were carried out on a mobile device, but seen as too difficult to read on that device, so they information found was transferred to a fixed computer. At other times, in-depth searches may have been carried out on a fixed device, but the files were transferred to a mobile device so they were available to read in quiet, convenient moments, wherever and whenever that may be.

' .... if I was wanting to find information in Summon myself, I probably wouldn't use the online [mobile] *interface because I know I wouldn't actually want to read that PDF document that I'd end up with, on there. I think it's to do with what you're doing with the information afterwards, so finding it is usually fine on here and then sometimes I'll, like, email something to myself that I've found and then look at it on a desktop. It's not to do with the finding information, it's to do with the using it. A lot of the time the information isn't usable enough on something so small, I think.'*

'So if I'm half way through reading something I'll just send myself the URL. So that if I do manage to find something and I think, "Oh, that would be good, but it's just too fiddly to read on the screen", or it's something I would want to come back to, probably less so than I used to, but I used to just email myself the web addresses and then when I'm… I have a bit of spare time I would pop into the email and it would be a list.'

'In particular instapaper is an absolute godsend. Someone sends me an interesting link at work and I can't really justify the time to sit and read it, you just BANG, instapaper it and you know, when I'm on a bus journey or something I can just call up instapaper on my phone and there you go, you've got it without all the web ads around it as well'

5.3 The 'always on' nature of mobile

The "always on" nature of mobile devices means the interviewees were used to being constantly connected, always available, and found it hard to switch them off. The interviewees constantly multi-tasked with their devices and found they acted as a serious distraction at times, even to the extent of preventing them from processing new information arriving. Before they could think about and process any piece of information it had been replaced by something newer, creating a large amount of transient, unused information.

'I remember the first time I took a smartphone – or my PDA – into a meeting and realised that I could do something else while I was sat in that meeting. I could make a task list for the other things I needed to get done that day, or whatever.... I find it much less easy to focus on something because there's all those other things that you know that you can find out about, that you can pull information in about .... Whereas before, you probably would have thought about a bit of information that you were interested in and maybe forgotten about it by the time you walk through the door and then maybe possibly remembered it again three hours later and maybe searched for it. Now you search for it straight away, but that interaction with that information is probably more transient because you don't necessarily have the time to process it.'

'It's like an addiction. It's that horrid thing of, "Well maybe there's something new there that I haven't seen".'

'I can do multiple things. On the iPod Touch I have quite often had two or three pages open. And flicked between them.'

Information is constantly pushed to us

As well as being available for searches, mobile devices are also heavily used for "push" services, where information is pushed directly at the users, adding to the overload of information.

'There's always the distraction of it will go "beep" at you and you'll think, "There's something I'm supposed to be doing now" or "There's somewhere I'm supposed to be" or "I wonder who that email's from?"'

'On my home screen I have an RSS reader for my favourite gadget or news websites and it pulls them all into one place in a nice graphical interface that you can scroll through which is great.'

'Well, you put in all your favourite podcasts say from the BBC website, they've got the RSS link, it goes into that and then it automatically downloads them for you and even when you're not using the phone it'll download the podcast so that the latest one's there.'

'xxxx is always telling me off for stopping in the middle of sentences because I'll get halfway through what I was saying and then be distracted by a thought that was related to something that I maybe saw, or this flashing out the corner of my eye.'

There seem to be limited coping mechanisms for this at the moment, beyond trying to limit time spent on the mobile devices, which is difficult. The one emerging coping mechanism seems to be the creation of different online personalities and segmentation of types of information into these different online personas. Some interviewees created different email addresses and social media accounts, switching between them to reflect the aspects of their social or work lives they were addressing at the time.

'But it's also changed my laptop… my computing habits, I think. Because this is continually going, "Hello!" and I go home I kind of miss it in the evenings. So I tend to quite often have my laptop on. And I've started to try and wean myself off that, thinking, "I'm on the computer all day..."'

'My online persona; I don't think I've exactly worked out where that is, do you what I mean?'

'I've got at least four email accounts that I actually use reasonably regularly. So depending on what it is I'll throw it one way or the other.'

5.4 Summary of modes of engagement

There are six significant aspects of information engagement on the move that emerged from this study, split into three themes:

"How people search for and evaluate information on the move" showed there was a desire for quick and easy searches, with the shifting of evaluation of information sources to prior selection of trusted sources, that there was a contextual nature for most searches, and that there were social aspects of discovering information through mobile devices.

"How people use information and create new knowledge on the move" showed how interviewees used mobile devices as an extension to their normal memory, perhaps allowing space for higher level functions. This was complemented by the idea of easily moving information between devices, so it could be examined at the most appropriate time or on the most appropriate device.

“The ‘always on’ nature of mobiles” described the influence on the interviewees of the always on, always connected mobile internet and the way it can constantly push information towards us. One area of concern raised by several interviewees was the limited coping mechanisms they had to deal with this feature.

6. Concluding thoughts

There is a desire for information on the move that is often context- or location-specific. With the recent increase in internet-enabled mobile devices, from iPhones to e-book readers, it is becoming the norm to own devices that we can use to try and satisfy those information needs and desires.

The current dominance of competency-based IL models do not take into account the changing nature of information discovery and use on the move and never could, due to the rapidly evolving technological landscape. Instead the dominant models are largely lists of 'standards', leaving a gap for true IL models that describe how people act in real life.

There is scope for a significant amount of further research, examining the searching for and use of information outside the standard work or study environments. This would move us from the effect of mobile devices on IL, as described in this article, to how IL is experienced on the move, regardless of the technology used. It could start to build IL models that reflect how people relate to the world of information outside of libraries, workplaces, or other traditional study environments, and describe the contextual richness that changing location introduces. From the results of this research, it appears that technology is enabling a change in behaviour that makes the interaction with information when the user is mobile as important to address as the interactions when the user is in a dedicated work or study environment.

This study has found six key areas where mobile devices affected the information behaviour of a small group of interviewees, which both supports and extends evidence in the existing literature on mobile search behaviour. These six areas are heavily influenced by the technology people use, which is continuing to change at a rapid pace.

The mobile information behaviour observed in users in this study can be used directly in practice. When providing services to library users, information professionals should be aware that an individual’s information behaviour could be significantly different when using mobile devices or when they are on the move, compared to within our library buildings, or from a fixed device.

Our users are likely to expect searching from a mobile to be quick and easy, so there is likely to be less call for complicated databases from mobile devices, and more utility found in making key information easily available, or enabling access to information that users already know should exist (such as opening hours, or mobile friendly reading lists that show where the items can be found).

Contextual and location-specific information is widely sought in a mobile environment, so information professionals may need to consider making information about our libraries available that includes embedded location data, allowing it to be easily found by a location-specific search. When developing mobile websites and apps for our libraries, it may be worth changing the information displayed depending on the location of the user.

The social nature of mobile information means libraries need to be increasingly aware of how they appear on social networks, and how libraries can use them to promote our services and educate our users, becoming a trusted source for our users.

The trend to delegate information to mobile devices, and to transfer information and files between devices regularly, may mean libraries need to consider how they provide information. We should

be considering how easy it is to bookmark information, and whether we provide information in a format that will easily display on a range of devices. Information professionals also need to consider whether they can help our users with the organisation and management of this information, something unlikely to be addressed in traditional IL classes.

The 'always on' nature of mobiles and the difficulty in managing the resulting stream of information provides opportunities for librarians to develop our own, and our users', abilities to manage this information. This includes awareness of how our information appears in the online and mobile environments.

This study and review of the literature is a starting point for considering how library users prefer to access information on the move. This differs significantly from normal library practice, which tends to be focused on what services and information we are able to provide. This shift in focus from what librarians and information professionals can do, to reflecting on how our users actually work, is an important area for libraries to consider in an increasingly mobile environment.

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