INVOLVING USERS TO SUCCESSFULLY MEET THE CHALLENGES OF THE DIGITAL LIBRARY: A 30 YEAR PERSONAL REFLECTION

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Introduction

Over the past 30 years, digital libraries have developed at a pace which would have surprised academics, researchers and students (and probably librarians as well) back in the 1990s. People are being able to access more and more electronic information every day via new services that make the process quicker and more effective. It would be wrong to underestimate the challenges, decisions and issues digital library service providers have had to address to reach this position. They have been faced with unprecedented levels of complexity and uncertainty in providing digital services to a user population that in itself has changed in many ways.

This paper will address from a personal perspective how the challenges posed by uncertainty and complexity have been resolved. The pivotal argument is that much can be gained by using the inter-related concepts of User Experience (UX) and Evidence Base Librarianship (EBL) in shaping digital library development. The author will identify how these approaches have been used at a practical level. There will also be a reflection on some of the lessons learned in adopting UX and EBL.

User Experience (UX)

A variety of definitions of UX have been produced but the following has a real resonance for the digital library:

> Every aspect of the user's interaction with a product, service, or company that make up the user's perceptions of the whole. (UX) design as a discipline is concerned with all the elements that together make up that interface, including layout, visual design, text, brand, sound, and interaction. (UX) works to coordinate these elements to allow for the best possible interaction by users. (Usability Book of knowledge, n.d.)

The Users Experience concept (UX) has recently emerged as being important in how libraries need to be strategically managed. A succinct and persuasive argument for placing the digital library user at the centre of the service was produced by JISC (2013). The world where researchers and students measure the library services against Google and Amazon is described. Libraries are no longer the only place where people go to access information and seek advice but instead are one of many places in a much larger and complex information world. The closeness between the researcher and library has been worn down as it very often is not the starting point for research. This situation strongly indicates to the digital library provider that they need to develop insight, understanding and awareness into users' behaviour and expectations so they can ensure their services are relevant. The argument is further developed by Harbo and Hansen (2012) who observed that digital library users have very complex sets of needs but these may be very different from how librarians actually perceive them. The digital library needs to be continuously improved and informed by the users' experiences for it to be fit for purpose. Real concerns have been expressed that librarians' need a higher level of engagement and understanding of all users (Stephens 2011) and that UX thinking 'must be integrated into all aspects of a library' (Schmidt 2011).

The increasing importance of UX for library services providers is demonstrated by the establishment of *Weave* (http://weaveux.org/) which is a peer-reviewed, open access, web-based journal. As a journal of library user experience its aim is to "improve the practice of UX in libraries, and in the process, to help libraries be better, more relevant, more useful, more accessible places". UX has not always been seen as important, indeed Carr (2006) looks back at an era where users were seen as an irritant and were expected to be grateful for what librarians decided they needed. Remnants of this negative view were still around in this millennium when Robinson (2007) argued that user involvement was the "abdication of responsibility".

Evidence Based Librarianship (EBL)

Evidence Based Librarianship (EBL) and UX are concepts which linked concepts around the process whereby evidence about the users' experience is applied in making decisions about digital library service delivery. Eldredge (2002, p. 71) proposed that EBL "seeks to improve library practice by utilising the best available evidence in

conjunction with a pragmatic perspective developed from working experiences in librarianship. The best available evidence might be produced from quantitative or qualitative research deigns" The concept and ideas behind Evidence Based Practice were first developed by health professionals but they have been adapted by other disciplines, including librarianship. Booth and Brice (2004) have provided a detailed exploration and overview of EBL. The process for EBL is quite similar to the research process. The first stage is very important when the problem/ question is defined. This then leads to the search for and evaluation of the evidence/ data. Establishing this focussed, relevant, significant and answerable practice based question is crucial. Within the context of the digital library, Marcum (2003) proposed the following key questions:

- How are digital resource users best served? What resources will they want? How will they want to use them? And, what services will be enhanced?
- What elements are required for a coherent preservation strategy covering resources both digital and print?
- What kinds of education will 'librarians' of the future need?

When EBL is being used, the best available evidence is identified about how the library service can be improved with the data very much informing strategy identification and decision making. A study by Long and Schonfeld (2014) has shown EBL's contribution in developing effective library strategies. They surveyed US university library directors (with 499 responses) and a key finding was that the majority felt they did not have a well-developed strategy for serving the changing needs of users. The libraries that were confident in their strategy were those who were **actively involved** in evidence gathering and other forms of assessment.

Questions faced and answered over the past 22 years of digital library development

The author has been involved for 20 years plus in digital library development, where there has been an implicit emphasis on applying both UX and EBL. This included being Co-Director of the IMPEL2 (Impact on People of Electronic Libraries) project which was a major part of the 1990's UK electronic libraries (eLib) programme. Among the 50 plus eLib projects, IMPEL2 was the only one where the focus was the

human and organisational aspects of the digital library. Included in the 5 IMPEL2 strands was a study which was one of the first to explore the digital library users' experiences (Jackson, Bartle & Walton 1999). IMPEL2 project's other 4 strands (UKOLN, n.d) focussed on the impact of the electronic library in different aspects:

- Library staff: monitored the impacts of the electronic environment on library and related support staff and drew out the key issues in the management of the networked campus.
- Resource based learning: investigated the impacts on library and information services of resource based learning policies.
- Library staff development and training: focused on the issues of training and development for library and information staff working in an increasingly electronic environment.
- Evaluation completed an impact analysis of the EduLib and Netskills projects, two eLib projects which delivered complementary types of training to users and providers of electronic systems and sources

The overall intention of IMPEL2 was to be a" basis for more informed decision-making and provide a clearer picture of the role of academic libraries in the context of national teaching and learning initiatives and in support of research" (Edwards, Day & Walton, 1998, p. iii). EBL and UX are all part of the need for informed decision making which IMPEL2 aimed to support over 15 years ago.

One of the advantages of the digital library is the ease in which metrics can be automatically generated. Producing data on the quantity of downloads, the numbers of times web pages are accessed and the large range of available e journal titles is straightforward but, in terms of the UX, has limitations. Evidence of a different nature (primarily qualitative) is needed if digital library services are truly to be enhanced and informed by the users' perspective. An alternative perspective is argued by Franklin, Kyrillidou and Plum (2009) who are more in favour of metrics than surveys etc.

The author's 30 years work as an academic library practitioner is used to provide perspectives into how evidence and UX has informed digital library direction. Table 1 shows the massive increases in digital library provision between commencing library

work in 1977 where digital provision was virtually not present at all to 2014 where digital information and services are everywhere. In the intervening years, challenges have had to be addressed and many questions have needed answers. These challenges will be explored and the lessons learned will be examined.

Table 1: Differences in digital library delivery between 1977 and 2014: a personal perspective

Time and place of work	Level of digital library provision
1977: Librarian, Highland Health Science Library, Inverness, Scotland	• None apart from terminal available over 250 km away where requests could be made for online searches
2014: Head of Planning and Resources Loughborough University Library, England	• Providing over 37,000 e-journals • Library app developed to allow mobile access to services • Access provided to over 150 electronic databases • Over 200 open access computer work stations provide in Library • Library Online Public Access Catalogue replaced by resource discovery tool • Library web pages, Facebook, Tweet, blog used to communicate and market services to users • Extensive and detailed digital literacy programmes delivered to students • Institutional repository overseen and managed with over 12,000 full text items • Around 10,000 e-books

For the author, work around developing digital library services started in 1991 and has increased incrementally each successive year. Table 2 captures the questions that have arisen, how evidence was collected to provide answers and what was changed as a result.

Table 2 Questions about digital library provision, how evidence was collected and how it was used

A (1992) How would library users like training delivered for using CD-ROM databases? (Aarvold &Walton 1992)	
How information about digital library user was collected	*Survey was administered to nursing students about how they wished to acquire skills in using CD-ROMS*
How it was used	*Various options on training were identified including one-one, group instruction and workbooks*
B (1996) Will digital library users still need intermediaries? (Walton, Day & Edwards 1996)	
How information about digital library user was collected	*Using scenario planning (originally developed in the oil industry) digital library users explored how the online searching intermediary would change their function*
How it was used	*Identifies that the intermediary becomes more involved in delivering digital searching skills*
C (1999) How are UK academic staff and researchers using digital library services? (Jackson, Bartle &Walton 1999)	
How information about digital library user was collected	*Part of IMPEL2 UK eLib projects. Literature review and interviews with 55 academic staff and paper survey with 1340 responses across 17 universities*
How it was used	*Decides that in short term, need to continue providing simultaneous access to paper and online information*
D (2000) How should digital interfaces be developed to give students access to both print and electronic information? (Ellis et al 2000)	
How information about digital library user was collected	*Interviews took place with students and academics about what print and electronic information they needed to access*
How it was used	*Views and concerns from users were taken to inform how interface was developed*
E (2005) How do students feel about using digital libraries via mobile technologies? (Walton, Childs & Blenkinsopp 2005)	
How information about digital library user was collected	*Literature review and paper survey of mature students. Low level of student awareness, limitations of hardware and software are main barriers to using mobile phones for learning*
How it was used	*Hold on mobile development until some of barriers have been overcome*
F (2006) How do students use digital sources in their assessed work? (Gannon-Leary et al	
How information about digital library user was collected	*Literature review and citation analysis of references from assignment by 40 students. Followed up by focus groups with two student groups. 12% of references were from quality Web sites*
How it was used	*Students given further training on referencing web sites*
G (2007) Do academic staff just need access to e journals? (Brown, Lund & Walton 2007)	
How information about digital library user was collected	*This followed up previous study exploring e-journals and their levels of importance. 225 responses were received. Most of the barriers to e-journal usage identified previously have disappeared.*
How it was used	*Provided evidence that for researchers, Library as place for*

	consulting journals has declined in importance. Library space was changed in its usage as a result.
H (2007) How do academics and researchers use electronic databases? (Walton 2007)	
How information about digital library user was collected	*Semi-structured interview held with 10 academic staff on how they used Library provided electronic databases.*
How it was used	*Many Library funded digital resources were used without researchers being aware of where they were provided from More Library branding introduced to provide insight*
I (2007) How do students use fixed pcs when accessing digital library services? (Burke et al 2008)	
How information about digital library user was collected	*Online student survey of Loughborough University and La Trobe University (Australia) exploring where and why students use fixed pcs on campus. 83% used fixed PC on daily basis*
How it was used	*Indicated there was a need to maintain/ increase number of fixed pcs in library*
J (2009) How do users feel about having print current periodicals removed to create ICT rich learning zone? (Bryant, Matthews & Walton 2009)	
How information about digital library user was collected	*Ethnographic study of space where current periodicals used to be located. 30 + hours participant observation*
How it was used	*Provided evidence that the space was used as social learning area and performed wide range of functions*
K (2010) How successful is the Library web site in meeting the needs of students and researchers? (Cunningham & Walton 2010)	
How information about digital library user was collected	*Mystery shopper exercise organised using scenarios whereby people used the web site for specific purposes*
How it was used	*Home page was completely amended to include logging in access to resource discovery tool and opening hours given high profile*
L (2011) In the digital age, how do researchers approach publishing their work? (Ashby et al 2011)	
How information about digital library user was collected	*Online survey with 142 responses establishing the different outputs researchers used and their attitudes towards them. Showed that peer reviewed journal was most important, and that Web 2.0 was starting to have an impact*
How it was used	*Library delivered training programmes on measuring impact of research and how to establish where to publish*
M (2012) How do researchers respond to the move to Open Access publishing (Appleton et al 2012)	
How information about digital library user was collected	*Online survey exploring issues around attitudes towards open access and institutional repositories. 161 responses which represented about 8% researchers.*
How it was used	*University and Library took various steps to overcome reservations about OA quality and publishing costs of some OA journals*
N (2012 How do students use Web 2.0 in their studies and what does it mean for the digital library? (Narborough, Stubbings & Walton 2012)	
How information about digital library	*Online survey completed by 178 students which showed that Facebook used for both social and academic purposes*

user was collected	
How it was used	*Library had received requests to not allow access to Facebook as this tied up fixed PCs. Evidence showed Facebook used for academic purposes as well so access not restricted*
O (2012) What are students' reading behaviours with digital and print information? (Barnett et al 2012)	
How information about digital library user was collected	*Online survey on reading behaviour with 1106 responses. Web sites and books top reading sources. 63% said they did not read enough*
How it was used	*Leisure e and print books purchased to encourage reading*
P (2013) What are the implications of students and Bring Your Own Devices (BYOD) on the digital library service? (Brewerton et al 2013)	
How information about digital library user was collected	*Focussed paper questionnaire administered to 150 students establishing how they used fixed pcs, laptops and smart phones for academic and social purposes*
How it was used	*Reinforced the need for Library fixed pcs and also indicated no urgent, pressing demand for academic mobile services*
Q (2014) How are academics using digital library services? (Walton, Brewerton, Cunningham, Leahy and Walton, 2014)	
How information about digital library user was collected	*Semi structured interview held with 20 academic staff exploring how they use digital library services (including resource discovery tool, e journals, institutional repository, e-books)*
How it was used	*Various actions taken to improve access to e-books and also enhancements introduced to resource discovery tool*

Reflections on facing the challenges of digital library development

The appearance of technologies such as the Internet and Web 2.0 has accelerated the development of digital libraries. This is illustrated in Table 2 which records 17 instances between 1992 and 2014 when there were questions around digital library service development that needed answering. The first 5 explorations (A – E) took place in the 13 years between 1992 and 2005 with the remaining 12 (F – Q) occurring in 8 years (2006 to 2014). Digital library provision is becoming more complex as change accelerates in information seeking behaviour, wider society and ICT. Science fiction 30 years ago described technologies that are now common place. One obvious trend has been the transience of some technologies (such as floppy discs, mini discs and modems). It is ironic that the technology (CD-ROM) that brought end user searching to academic staff and students is now virtually obsolete. Up until early 1990s, bibliographical online databases were provided commercially with charging mechanisms based on various costs (including time on-line) which were the rationale for an intermediary to undertake the search for a user. These databases were then provided on CD-ROM, thus allowing end user searching to become a reality. The

impact of this technology on libraries cannot be underestimated as users' behaviours and expectations were transformed. CD-ROMs proved massively popular with library users and librarians devoted much time and effort in developing CD-ROM training material and making the CD-ROMs available via intranets.

This all changed in the late 1990's when these same databases were made accessible via the World Wide Web. The Unique Selling Point of CD-ROMS was removed instantly and within 2 years there was virtually no demand from users. The lessons learned from CD-ROM provision is that digital library services providers have to be able to differentiate between those service for which there is a demand and those services which are marginal. At the same time, the librarian needs to have future services being planned that anticipate the users' future needs. Digital libraries have to be continually adapting and altering to ensure services provided are at least as good as Google and Amazon. The author has learned some key lessons when the UX is used to shape digital library development.

Managing digital library evaluation: gathering evidence about digital library users so that services can be appropriately amended and developed will not happen by chance or without specific skills. Management effort has to be invested in proactively coming up with the right questions and then establishing the best way to gather the relevant evidence. It is impossible to predict when evidence is needed for impact assessment and for evaluation. *Just in Time* is not good enough and data collection has to be ongoing so that data is ready when needed. It is also crucial to make sure there are the requisite skills exist within the library workforce around research methodologies, data analysis and interpretation. An unfortunate assumption is often made that the work is completed once the data and evidence have been collected. This is definitely not the case as mechanisms and structures are necessary to manage the translation of the findings into recommendations and then actions. These specific actions themselves should have a process which will monitor their progress and eventual success levels.

Collaboration: the process of evaluation and assessment of the digital library offers the opportunity to collaborate with various different stakeholders. Benchmarking comparisons can be completed with other digital library providers at regional, national and international levels. A staff development opportunity is provided if a library team

is set up to oversee the work. This allows people to gain transferable skills and experience as well as the chance to use their own knowledge. Partnerships with users themselves (such as students, researchers and academics) are ideal opportunities to capture the UX. Users can provide insights and perspectives that library staff do not have whilst at the same time bringing advice on methodology and context. The down side of collaboration is that it increases the complexity and also makes coming up with a unified and agreed agenda sometimes impossible.

Dissemination: Many digital libraries undertake evaluations and users' assessments of their services and then only apply the outcomes internally. By not seeking to disseminate the outcomes outside the organization, the wider library community does not benefit. If there was a culture in digital libraries whereby practitioners use their studies to enhance and enlarge the knowledge base, EBL would be much easier! Wider dissemination can be time consuming and challenging but it can provide career development opportunities, skills acquisition and feelings of pride and achievement. In many ways, social media is ideal for communicating key findings, outcomes and actions to the wider world. It provides platforms to share findings and also encourages pertinent debates and discussions otherwise not possible. There is one aspect of work which is does not happen – the production of a well-structured and presented report (with concise executive summary). This is needed to maximize impact as they can be disseminated by institutional repositories and web sites. Digital library providers can also look to present their work at a suitable conference and also seek to publish in professional and/ or research journal. Other professions (e.g. medicine, education) take dissemination seriously and as a result have developed substantive knowledge bases that practitioners can use to improve services.

Pragmatism: when considering UX and EBL, the validity and reliability of the evidence used can be lead to major disagreements between practitioners and academic researchers. The criticism directed to practitioners is that there is a reliance on surveys and single case studies. Practitioners' response is that delivering digital library services alone is time consuming. There are often no extra resources for capturing UX and applying EBL which means evaluations and analyses have to be completed on top of existing heavy workloads where there are many other competing priorities. This does significantly influence how the evaluations are approached and methodologies chosen. Practitioners have to show a sense of realism when exploring the digital

library UX. Unless there is dedicated funding, methods have to be chosen which are relatively quick to both administer and analyse (on-line surveys perform on both counts). This rationale around methodologies for UX is questioned by Priestner (2014) who very much advocates interviews and ethnographic methodologies. There is no question that these are effective but they are costly in both data collection and analysis. One of the challenges of the digital library is around cost effective approaches to gather both qualitative and quantitative data. A balance is necessary to enable quality evidence to be gathered in a way which is not labour intensive.

Conclusion

The digital library UX explored over 15 years ago in the IMPEL2 user study (Edwards, Day and Walton, 1998) captured many differences and similarities to the current digital world. For example in 1998, over 40% library users never accessed e-journals and only 50% regularly checked e-mails. These behaviours have obviously changed but there were some issues which are still present in users. In 1998, peoples indicated that they were concerned with "the risk of plagiarism, the quality and quantity (too much) of information available, speed of access, commercialization of the Internet and inadequate searching techniques" (Edwards, Day and Walton, 1998, p. iv). Understanding how people's concerns change (or do not change!) is all part of UX.

It is hoped that this paper has demonstrated at a practical level about how information about the digital library UX needs to be identified and explored. There is no indication that the pressures and incentives to practice Evidence Based Librarianship (EBL) will diminish with the world becoming more and more digital. This is demonstrated at a personal level where there are two questions where evidence is being gathered to provide the answers:

- Do researchers prefer Mendeley or Refworks for reference management software and what support do they need?
- In the context of the digital library, what do researchers and students do in informal learning spaces, why do they use these spaces and how can they be improved?

In a few months, there will be questions about the digital library that cannot be predicted. If the UX is understood, there is a good chance the evidence to provide the

answers will be found. The importance of UX for the digital library has been summarized by Law (2010, p. 11) who states that "we must discover what our customers want and build on that rather than attempting to lead them to towards a future which they think is irrelevant".

References

Aarvold, J Walton, G 1992, 'CD-ROM: towards a strategy for teaching and learning', *Nurse Education Today*, vol. 12, no. 6, pp. 458 – 463.

Appleton, A, Ashby, M, Brown, J, Chikoore, L, Crawford, A, Gadd, E, Stockdale. Z & Walton, G 2012, *Open Access at Loughborough University: survey of researchers' and academics' attitudes*, Loughborough University Library. Available from: <http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/Open%20access%20at%20Loughborough%20University%202012.pdf>. [31 July 2014]

Ashby, M, Espinet, E, Fry, J, Lund, P, Stubbings, R and Walton, G 2012, *Scholarly communication at Loughborough University Library*, Loughborough University Library. Available from: <http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/scholarly-comm-lboro2011.pdf>. [31 July 2014]

Barnett, L, Halbert, H, Healey, E, Kinna, R, McKeating, S, Swinscoe, A & Walton, G (2012), *Academic reading at Loughborough University: exploring decision making choices and influences*, Loughborough University Library. Available from: <http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/Academic%20reading%20at%20Loughborough%20University%20(2012).pdf>. [31 July 2014]

Booth, A and Brice, A (eds.) (2004), *Evidence-based practice of information professionals: a handbook*, Facet Publishing, London.

Brewerton, G, Cunningham, M, Franklin, G, Walton, G and Woodhouse, C (2013), *Bring Your Own Devices (BYOD) at Loughborough University*, Loughborough University Library. Available from: http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/projects/Library%20IT%20Services%20BYOD%20study%20(2013).pdf >. [31 July 2014]

Brown, J, Lund, P and Walton, G (2007), *Use of e-journals by academic staff and researchers at Loughborough University*. Loughborough University Library.

Available from: <http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/ejournal_survey.pdf >. [31 July 2014]

Bryant, J, Matthews, G and Walton, G 2009, 'Academic libraries and social and learning space: a case study at Loughborough University Library', *Journal of Library and Information Science*, Vol. 41, no. 1, pp. 7 – 18.

Burke, L, Beranek, L, Walton, G and Stubbings, R 2008, 'Where and why university students choose to use computing facilities: a report on a collaborative study at an Australian and United Kingdom university', *Australian Academic and Research Libraries,* Vol. 39 No. 3, 181-197.

Childs, S, Blenkinsopp, E, Hall, A and Walton, G 2006, 'Effective e-learning for health professionals and students – barriers and their solutions. A systematic review of the literature – findings from the HEXL project', *Health Information and Libraries Journal*, Vol. 22, Suppl. 2, pp. 20 – 32.

Cunningham, M and Walton, G 2010, Mystery *shopper and University Library web pages*, internal Loughborough University Library document.

Edwards, C, Day, JM and Walton, G 1998, Monitoring *organisational and cultural change: the impact on people of electronic libraries, the IMPE2 project*. Library Information Technology Centre, London.

Eldredge, JD 2002, 'Evidence-based librarianship; what might we expect in the years ahead?' *Health Information and Libraries Journal*, Vol. 19, No. 2, pp. 71 – 72.

Ellis, I, Walton, G, Edwards, E, Hutton, A and Jones, D 2000, 'Living the HyLife: addressing the information needs of physiotherapists', *Physiotherapy*, Vol. 86, No. 5, pp. 249-256.

Franklin, B, Kyrillidou, M and Plum, T 2009, 'From usage to user: Library metrics and expectations for the evaluation of digital *libraries'* In *Evaluation of Digital Libraries: An insight into Useful Applications and Method*, eds G Tsakonas and C Papatheodorou, Chandos Oxford, pp. 17 – 40.

Gannon-Leary, P, Walton, G, Cader, R, Derbyshire, J and Smith, A, 2006, 'Use of evidence by nursing students: an interdisciplinary study', *Library and Information Science Research*, Vol. 28 No. 3, pp. 249 264.

Harbo, K and Hansen, VJ 2012, 'Getting to Know Library Users' Needs — Experimental Ways to User-centred Library Innovation', *LIBER Quarterly*, Vol. 21 No. 3/4 <http://liber.library.uu.nl/index.php/lq/article/view/8031/8392>

Jackson, M, Bartle, C and Walton, G 1999, 'Effective use of electronic resources', *Innovation in Education and Training International*, Vol. 36, No. 4, pp. 320- 327.

JISC 2013, 'The student experience and the future of libraries' *JISC Inform*, No. 36, pp. 10 – 17. <http://www.jisc.ac.uk/inform/inform36/LibrariesOfTheFuture.html> [31 July 2014]

Law, D 2010, 'Waiting for the barbarian: seeking solutions or waiting for answers In *Envisioning future academic library services: initiative, ideas and challenges*, ed S McKnight, S, Facet Publishing, London, pp. 1 – 14.

Long, MP and Schonfeld, RC 2014, *Ithaka S + R US Library Survey2013* Ithaka. Available from: http://www.sr.ithaka.org/sites/default/files/reports/SR_LibraryReport_20140310_0.pdf [31 July 2014]

Marcum, DB 2003, 'Research questions for the digital era library', *Library Trends*, Vol. 51 No. 4, pp. 636 – 651.

Narborough, J, Stubbings, R and Walton, G 2012 'Students' use of Web 2.0 and the implications for university library e-service development: a case study at Loughborough University Library, UK' In *Access to Knowledge (A2K), a volume of case studies and academic papers* eds J Lau, A-M Tammaro & T Bothma, K.G. Saur / IFLA, Munich, pp 93 – 112.

http://www.degruyter.com/view/books/9783110263121/9783110263121.93/9783110263121.93.xml [31 July 2014]

Priestner, A 2014, 'Why UX in libraries is a thing now', *Improving the student experience: providing services and support that are valued*, Business Librarians Association Conference, Leicester. Available from

http://www.slideshare.net/AndyPriestner1/why-ux-in-libraries-is-a-thing-now-36899649 [31 July 2014]

Robinson, L 2007, 'Abdication or empowerment? user involvement in library, archives and record services', *Australian Library Journal*, Vol. 56, No. 1, pp. 30 - 35.

Schmidt, A 2011, 'Is your library ready for a UX experience?, *Library Journal*. Available from: http://lj.libraryjournal.com/2011/11/opinion/aaron-schmidt/is-your-library-ready-for-a-ux-librarian/# [31 July 2014]

Stephens, M 2011, 'Listening to student voices', *Library Journal*, http://lj.libraryjournal.com/2011/06/opinion/michael-stephens/listening-to-student-voices-office-hours/

UKOLN n.d. *IMPEL2: Monitoring Organisational and Cultural Change*, UKOLN, London. Available from: http://www.ukoln.ac.uk/services/elib/projects/impel/index.html (archived site) [31 July 2014]

UKOLN 2001, *eLib: The Electronic Libraries Programme 1995-2001*. UKOLN, London. Available from: http://www.ukoln.ac.uk/services/elib/ [31 July 2014]

Usability Book of knowledge *Glossary.* Available from*:* http://www.usabilitybok.org/glossary [31 July 2014]

Walton, G 2007 *Loughborough University academics' use of electronic search tools in the research process: a qualitative study*. Loughborough University Library. Available from: http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/Elecsurv.pdf [31 July 2014]

Walton, G, Brewerton, G, Cunningham, M, Leahy, F and Parry, F 2014, *Exploring academics' changing use of Loughborough University Library's digital resources*. Loughborough University Library. Available from: http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/Academics'%20use%20of%20digital%20resources%20(2014).pdf [31 July 2014]

Walton, G, Childs, S and Blenkinsopp, E 2005, 'Using mobile technologies to give health students access to learning resources in the UK community setting', *Health Information and Libraries Journal*, Vol. 22, Suppl. 2, pp.51 – 55.

Walton, G, Day, JM and Edwards, C 1996 'Disintermediation: the relevance of the IMPEL2 Project', *Proceedings of the 20th International Online Information Meeting*, London, pp. 357- 362