Research on e-book usage in academic libraries: 'tame' solution or a 'wicked problem'?

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The result of a systematic analysis of the literature on research about the usage of e-books in academic libraries published in the United States and the United Kingdom between 2004 and 2014 is examined. Commonalities were identified amongst the articles, together with factors such as questions asked, user response and the research methods that were used. Several areas of deficiency were identified in the conduct of the research and, in order to contextualise the issues, Horst Rittel and Melvin Webber's (1973) characteristics of a 'wicked problem' and a 'tame problem' were used as a framework. It was concluded that e-book usage does exhibit several of the characteristics of a wicked problem, and uncertainty about the exact nature of the problem will remain until further research has been conducted into the various aspects of e-book usage, such as reading and comprehension.

Keywords: E-books, soft systems methodology, research studies, wicked problem, tame problem, e-book usage

1 Introduction

The need to understand e-book usage has only been identified as a problem within the past few years due to the realisation that the methods that have historically been used for assessing usage – loan statistics and similar measures – did not reveal accurate or adequate information about the real pattern of usage (Sprague & Hunter 2008). Implicit in the assumptions of many collection managers is the expectation that a print resource and its equivalent e-book are interchangeable as far as the user is concerned (Jabr 2013; Mangen, Walgermo & Brønnick 2013). Significant proportions of acquisition budgets are being spent by academic libraries in many countries on electronic books (e-books) or the implementation of e-books in their libraries (Slater 2010; Walters 2013). It is of strategic significance to know whether the money spent by academic libraries and the effort put into such an endeavour is effective. How the resources are being used and what users think of e-books are significant factors for collection building and management (Bucknell 2012).

Levine-Clark (2006: 286) noted that the assessment of user satisfaction with e-books has been somewhat neglected and that research about e-books has concentrated on the assessment of technologies such as vendor provision. However, how users perceive e-books and the reasons underlying e-book use or non-use are important factors for both libraries and e-book publishers and the complexity of this perception should not be underestimated.

This research depended upon critically reading the literature dealing with user satisfaction with regards to e-book usage: it became apparent that many researchers tended to ignore various issues that have an effect on how the data collected is interpreted. For example, a low response rate, the types of questions asked and the method of research. Even the location of the research is important: there are several examples of potentially erroneous inferences about e-book usage based upon studies conducted in another country or milieu. Confusion over the definition of an e-book as well as what the word 'usage' implies is another major issue: can one really trust data from a questionnaire completed by users who have indicated at the outset that they do not know, or are unsure of, what an e-book is (Croft & Bedi 2004; Shepherd & Arteaga 2014)? Many participants in the research reviewed indicated that they did not know what an e-book was; they chose the "I do not know" option in the survey (Rowlands et al. 2007; Nicholas et al. 2008). Furthermore, in some studies it was discovered that participants did not know what an electronic resource was (Levine-Clark 2006). These issues may be considered as making the question, 'how should e-books be managed in our collections?' characteristic of a 'wicked problem'.

2 Exploring problems

Soft Systems Methodology, pioneered by Peter Checkland in 1981, is often used when approaching problems that are thought to be complicated or intractable (Underwood 1996). Soft Systems Methodology can be defined as an "organized, flexible process for dealing with situations which someone sees as problematical, situations which call for action to be taken to improve them, to make them more acceptable, less full of tensions and unanswered questions" (Checkland & Poulter 2006: 4). Soft Systems Methodology is a good method to use when tackling 'wicked problems' because it specifically deals with situations that have a strong social element to them.

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2.1 Wicked problems

The term 'wicked problem' can be described as referring "to that class of social system problems which are ill-formulated, where information may be confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (Churchman 1967: B-141). The term was introduced in 1967 by Horst Rittel and developed with Melvin Webber in a paper published in 1973 entitled 'Dilemmas in a general theory of planning' (Rittel & Webber 1973). Rittel and Webber (1973) clarified the usage of the word 'wicked' in 'wicked problem' as implying that they are tricky and elusive and little influenced by social and political factors (Kreuter et al. 2004: 442; Rittel & Webber 1973: 160). The authors spoke about how the sense of 'wickedness' refers to the difficulty of determining a solution or solutions, rather than any assertion of intrinsic evil. Wicked problems have also been referred to as "ill-structured problems" by Mitroff and Mason (1980: 339) and as "social messes" by Ackoff (1974: 21), who coined the term because he believed that there was no suitable word to describe a "system of problems".

Rittel and Webber stated that a wicked problem should have ten characteristics. The characteristics are:

1. there is no definite formulation for a wicked problem;
2. wicked problems have no stopping rules;
3. solutions to wicked problems are not true or false, but better or worse;
4. there is no immediate and no ultimate test of a solution to a wicked problem;
5. every solution to a wicked problem is a 'one-shot operation'; because there is no opportunity to learn by trial-and-error, every attempt counts significantly;
6. wicked problems do not have an enumerable (or exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan;
7. every wicked problem is essentially unique;
8. every wicked problem can be considered to be a symptom of another [wicked problem];
9. the causes of a wicked problem can be explained in numerous ways. the choice of explanation determines the nature of the problem's resolution; and
10. [with wicked problems,] the planner has no right to be wrong (Rittel & Webber 1973: 161; Ritchey 2013: 4).

Examples of wicked problems offered by Conklin (2005: 8) and Ritchey (2013: 2) include such questions as to whether to build the highway through the city or around it and how should crime and violence be dealt with in schools. These examples meet the ten characteristics of a 'wicked problem' and they also have a human or social element to them that will affect any decision made. Other issues where wicked problems are commonly found include healthcare, poverty and terrorism, to name just a few (Batie 2008: 1176).

Ritchey (2013: 3) notes that the criteria for a 'wicked problem' can be limited to four or five characteristics as the original set of characteristics contains elements of repetition and that the set could be simplified. There is not complete agreement on which are the unique factors. A typical example of this approach is the analysis conducted by Burns, Hyde and Killett (2013), who proposed a simplified set:

1. wicked problems have no definitive formulation;
2. the search for a solution to a wicked problem is 'open-ended';
3. solutions are not true-or-false, but good or bad;
4. there are no rules or criteria to determine how a wicked problem should be explained; and
5. a wicked problem is a symptom of another problem.

2.2 Tame problems

Rittel and Webber introduced the notion of a 'tame problem', which they also referred to as a 'benign problem', as problems with which scientists and engineers encounter, grapple and attempt to solve. Examples are activities such as finding a solution to a mathematical equation or achieving checkmate in a chess game within a certain number of moves (Rittel & Webber 1973: 160). These two examples of tame problems show that there is a clear objective, and it will be readily apparent whether or not the problem has been solved.

A problem is considered 'tame' if it has the following characteristics or distinguishing features (Conklin 2005: 9; Ritchey 2013: 2):

1. a well-defined and stable problem statement;
2. it belongs to a similar class of problems which are solved in a similar way;
3. the solution can be objectively evaluated as right or wrong;
4. a definite stopping point – it is apparent when a solution has been reached;
5. solutions can be easily tried and abandoned; and
6. it comes with a limited set of alternative solutions.

A tame problem, then, has a clear beginning and end (Hancock 2010: 34) and is susceptible to solution using analytical methods or approaches used by researchers in their relevant disciplines (Kreuter et al. 2004: 442).

2.3 Differences between tame and wicked problems

There are four factors that can be considered to distinguish a wicked problem from a tame problem. Table 1, which is based on the Conklin (2005) and Ritchey (2013) formulation discussed in section 2.2, lists the factors and identifies the differences between a tame problem and a wicked problem.

Table 1 Characteristics of a tame problem and a wicked problem

	Characteristic	Tame Problem	Wicked Problem
1	The problem	A well-defined and stable problem statement. Has a clear definition of what the problem is and, as a result, it is also possible to 'unveil' the solution	Wicked problems have no definitive formulation. No agreement about what the problem is and each attempt to create a solution results in the problem changing
2	The role of the stakeholders	Belongs to a similar class of problems usually solved in a similar way. The cause of the problem can be determined by experts in the relevant field through the use of scientific data	There are no rules or criteria to determine how the problem should be explained. Stakeholders will have differing ideas about what the problem is and the causes of the problem
3	The 'stopping rule'	The solution can be objectively evaluated as being right or wrong. The search stops when it is recognised that the problem is solved	The search for a solution is open-ended. There is no definitive solution to such a problem and, as a result, the task ends when external forces (such as time and budget) prevail; the search is 'open-ended'
4	The nature of the problem	The solution can be objectively evaluated as right or wrong. The problem is similar to other problems that have protocols in place to achieve a solution; a potential solution is either 'true' or 'false'	Solutions are not 'true' or 'false' but 'good' or 'bad'. As every problem is unique, and there is no set protocol in place, solutions are based on the multiple judgements and opinions of the stakeholders. The problem may be a symptom of another problem

Source Kreuter et al. 2004: 443; Batie 2008: 1177; Burns, Hyde & Killett 2013: 515

A tame problem can be solved, but a wicked problem is incapable of solution. Instead, the effects of wicked problems can only be 'resolved' for a period before the issue recurs (Norton 2005: 132). Conklin, in the course of an interview, concurs, indicating that the recourse is to "negotiate shared understanding and shared meaning about the problem and its possible solutions" amongst the stakeholders (Conklin, Basadur & VanPatter 2007: 4).

3 The research problem

Vendors supply circulation statistics that show e-books are being used: however, they do not provide information about the reasons behind use, how e-books are being perceived and user satisfaction with the format (Al, Soydal & Tonta 2010). Consequently, there has been an interest in investigating e-book usage and user satisfaction at a deeper level: as a result, many studies have been conducted. The results must be interpreted with care: research that has been conducted in the United States, for example, cannot unhesitatingly be compared with the results of research conducted in the United Kingdom, even if it was conducted in the same year. Each country and, even, its individual states or provinces, is unique and cannot easily be compared with another, because the demographics of the population (such as age, education, culture and economic background) differ. Despite this, the published literature indicates that attempts at comparison are made.

The aim of the study was to discover whether the issue of e-book usage in academic libraries constitutes a 'wicked problem' or a 'tame problem'. The implication of the latter finding would be that the characteristics, nature, effects and use of e-books can be comprehensively and completely described and understood; the implication of the former is that no reliable and stable conditions of sufficient generality can yet be ascertained.

A total of forty journal articles describing research on e-book usage conducted in the United States and the United Kingdom, spanning a ten-year period (2004-2014), were collected and analysed. These articles ranged from a dissertation (Brown 2009) to articles published by vendors (Springer 2013; JISC Collections 2009) with academics using the same study and analysing it (Shelburne 2009; Nicholas et al. 2008), and finally academics and librarians surveying their own institutions (Levine-Clark 2006). While each article had the issue of e-book usage in common, the aims of the articles differed, resulting in a representation of a variety of research methods, target populations, questions and results. The research was analysed, looking for various factors and commonalities, such as:

1. location;
2. user response;
3. demographics (age, gender and academic status);
4. method of research used for data collection;
5. what part of the institution was surveyed (faculty or whole university);
6. questions asked; and
7. results and recommendations.

Another important issue is that of vendor-funded research. While research conducted by e-book platforms such as Springer and ebrary provides interesting results pertaining to user satisfaction, the question of whether they can be considered independent and reliable arises. Preference was given to research that was not vendor-funded.

4 Limitations and exclusions

The extent of the research is limited in that the findings are based largely on journal articles published over the course of the ten-year period (2004-2014) and that only articles written in the English language have been consulted. Additionally, a major limitation is the sole reliance on the literature, a substantial proportion of which is only available on the internet, to conduct the research. The thought processes of the researchers are unknown and, without personal discussion, remain unknowable, so conclusions can only be drawn from what is provided in the literature.

Some of the research material encountered was excluded from the final selection, even though it fitted the date and location parameters, mainly because the focus of the material was not exclusively on e-book usage or because of the mode of distribution. The majority of the selected research advertised for participants to help with the research via email or on the library website of the institution. For example, one article, the Joint Information Systems Committee (JISC) eCollections (JISC eCollections 2013) report, specifically targeted users who logged onto the vendor platform to use a specific section of books from the collection. Accordingly, this article was excluded from the research analysed because the method of distribution was problematic: it only surveyed those who accessed the platform during the specific time frame and not the user population as a whole.

5 Research on e-book usage in academic libraries: is it a wicked problem or a tame problem?

To help understand whether the analysis of e-book usage is a wicked problem or not, articles on research into e-book usage in academic libraries, collected in accord with the parameters set for this study, were examined. Several issues in the conduct of the research on e-book usage became apparent:

1. location of the research;
2. magnitude of user response (how many people completed the survey in comparison to the institution's overall target population);
3. method of data collection;
4. confusion over terminology; and
5. usage and awareness of e-books.

6 Analysis

Using the framework developed in Table 1, the results of the analysis of e-book usage will now be considered.

6.1 The problem

It is only recently that research investigating e-book usage has been initiated at an institutional level. While circulation statistics showed that people were accessing the e-books, it was unclear whether they were actually being read and what their process of reading embraced. Hence, some institutions that have provided e-books for at least ten years, on researching what the attitudes and perceptions of patrons are in relation to e-books, discovered that many do not know about the service.

While the aim of the majority of the articles in the reviewed research was to discover patterns of e-book usage and perceptions of use, it was not the sole purpose of some of the articles. The research questions and methods used did not necessarily focus exclusively on e-book usage and perceptions. This, in conjunction with the different results the research methods would produce and the variety of institutions examined, indicates that there is no well-defined and stable problem statement regarding the study of e-book usage within which the results can be framed. Furthermore, the reviewed research indicates that researchers are interpreting the issue of what constitutes the 'e-book problem' differently: it can thus be argued that there is no definite formulation or hypothesis and that, until there is, a wicked problem exists.

6.2 The role of the stakeholders

One of the reasons one conducts research is to discover whether a product or service is being used. However, with e-book usage, there are many factors that may influence use, such as screen size of the reading device, which may affect reading ease and comprehension (Liu 2005).

Electronic books are a relatively new invention, which supports the notion that e-book usage, as a problem, is 'unique'. However, when other concerns about e-book usage are considered, such as reasons for non-use, it may be concluded that there are some aspects that already have a history. For example, eye-fatigue associated with particular formats of information pre-dates the introduction of e-books (Dillion, McKnight & Richardson 1988).

Researchers also interpret and approach the investigation of e-book usage in different ways and in relation to their institutions, thus resulting in a variety of views in research and literature, some of which will be described below. For example, one institution may find the provision of e-readers and tutorials on how to access e-books are needed while another institution may find that increased awareness of the service, such as posters, is needed.

The analysis of the research literature included in the study indicates that the approach to the investigation of e-book usage differs from researcher to researcher and hence from stakeholder to stakeholder, and while the overall problem (e-book usage) is acknowledged, the research into the problem and possible solutions are not the same from researcher to researcher. Consequently, there is, as yet, no research paradigm, which is suggestive of the presence of a wicked problem.

6.3 The 'stopping rule'

The analysis of the research literature included in this study indicates that this 'substitutionary' view may be mistaken and that 'usage' comprises a social component involving multiple views, including the researchers themselves and extending to the collection managers and the users (Croft & Bedi 2004). Not all the literature gathered provided solutions or recommendations: Zhang and Beckman (2011) and Li et al. (2011) report on data collected and analysed, but no recommendations are made. For example, they report that e-book usage and awareness is low but do not necessarily develop the analysis to suggest how, in the circumstances, the institution could or should combat such issues. In others, some attempt is made to suggest approaches to improve visibility. For example, an improvement in advertising and training with regards to the use of e-books (Makin 2008; Folb, Wessel & Czechowski 2011) is aimed at development within the institution, whilst other recommendations were specifically aimed at a set of vendors (Abdullah & Gibb 2008; Lincoln 2013). Such recommendations cannot, of themselves, be regarded as of general significance or applicability.

It seems likely that any policy that is developed regarding e-book provision and substitutability at an institutional level would be individual to that institution since each academic institution is affected and influenced by the community that it seeks to serve. Consequently, for an academic institution to adopt a collection management policy in respect to e-books similar to a neighbouring institution without having tested user acceptability may be unwise. In respect of this characteristic, the assessment of e-book usage may be seen as a wicked problem because there is no agreed-upon body of research techniques.

6.4 The nature of the problem

The solution to any problem that involves people should not be considered as either true or false, because each is different, reflecting education, culture and upbringing, and it is not easy to predict what an individual might do, or be able to do, to control the confounding factors as one might do in an experiment.

Analysis of the literature included in this study revealed several examples where the difficulties of collection of valid and accurate data about e-book usage were exacerbated by the use of a survey as the sole research method, which exacerbated issues such as confusion over terminology and misinterpretation of questions (Springer 2013), factors that only become apparent from the comments made by participants (Shelburne 2009). Instead of a survey, a focus group or a semi-structured interview could be used, where the confusion over terminology would be (it is to be hoped) eliminated. However, these research methods are expensive. It would seem that any solution to the collection of accurate and representative data on e-book usage will be time-consuming and resource-hungry, to the extent that it may be a prohibitively expensive exercise.

It would appear that a tacit assumption in the development of collection management policy around the supply of e-books is that the utility of the print format and the e-book format are similar and that the information conveyed by each is identical. However, a complicating factor is that recent research has suggested that there may be a cognitive difference in comprehension between those reading text using print-on-paper resources and those reading the same text as an e-book (see, for example, Mangen, Walgermo & Brønnick 2013). This research tends to support the view that e-books and print-on-paper books may not necessarily be considered as substitutes for each other. It is also possible that there are other, less tangible, differences in the experiences of using each that only a psycholinguistic investigation may uncover.

7 The extent of the problem

E-book usage can be seen as a wicked problem with regards to this and the earlier-described characteristics because there is no consensus on how to reliably measure e-book usage, and the effects of reading results differ, depending on the research method used and questions asked. Moreover, there may be an, hitherto unexplained, cognitive effect as a confounding factor.

Whether e-book usage is a symptom of another problem is debatable. E-books were first invented as a potential answer to the need to facilitate information dissemination and also to prove that the infant technology was viable. In other words, it can also be understood that concern about e-book usage is a symptom of uncertainties surrounding the technology of e-books: this, in turn, is a symptom of the greater problem of information distribution.

Some would argue that the information profession is over-analysing the issue of e-book usage as people will use whatever format is available to them at their time of need. Others would argue that e-book usage is a problem that produces long-term effects, such as reading comprehension, which involves focusing, understanding and memory, especially if the use of e-books is incorporated into the school curriculum (Macedo-Rouet et al. 2003; Jeong 2010). However, this is an ongoing debate and more studies need to be done (Maynard & McKnight 2001; Grimshaw et al. 2007). Nevertheless, there is evidence to suggest sufficient uncertainty about the problem space to imply that this is a wicked problem.

8 Conclusion

Academics and researchers alike have been stating that the shift from reading print to reading from a screen was going to change how people read, write and comprehend. Levy stated that:

> [Digital libraries are] participating in a general societal trend toward shallower, more fragmented, and less concentrated reading (Levy 1997: 202).

While research has focused mainly on e-book usage and users' perceptions as well as comparative reports on e-book expenditure amongst institutions (Library Journal 2010), little rigorous research has been conducted on print versus digital literacy and the positive or negative effects reading from a digital device may have on an individual.

Analysis of research conducted in the United States and the United Kingdom spanning a ten-year period reveals a variety of research methods, target populations, questions and results, making it impossible to arrive at a reliable set of generalisable conclusions. However, two issues stood out the most. The first was that many participants in research undertaken did not know what an e-book was. This is seen when participants chose the "I do not know option" in the survey, and in some cases it was also discovered that participants did not know what an electronic resource was (Levine-Clark 2006).

Another interesting observation is confusion over the term 'usage'. It is a term which highlights a particular weakness, so far, in the research of e-book usage: the idea of 'use' differs from person to person.

It is difficult to produce accurate results and for other researchers to interpret those results when there is confusion over what an e-book is and what is meant by the term 'usage'. Another point that emerged from the analysis of the research is that some questions were too vague to collect meaningful data. For example, the JISC Collections (2009) and University of Liverpool eBook Study (2010) asked respondents how often they use e-books, or how many times have they used e-books in the past month: however, they did not consider that the answer to this question is dependent on the workload of the respondent. Other questions were asked but had no apparent value in the overall research. For example, Brahme and Gabriel (2012) and Cassidy, Martinez and Shen (2012) asked respondents about their age and gender; however the results of these two questions and reasoning behind asking them were never discussed.

There is a lack of research emanating from European countries, Africa and Australasia. It is evident that more research needs to be done on the subject of e-book usage on a global scale, especially as the internet and the use of electronic resources are – at least, in some contexts – replacing visits to the library and the reading of a physical book. This is especially worrying when studies have shown that the human brain does not necessarily comprehend and retain information read from a screen to the same extent as reading from the printed page.

The consequences of early adoption of e-books are that copious amounts of money may have been spent on a service that was not being used due to lack of awareness; that the disadvantages of spending long periods of time reading from a screen may have been ignored; and that the availability of the print format has become less promoted.

Earlier, the characteristics of a wicked problem were analysed in comparison to the problem of e-book usage, and while the comparison revealed that it appears to have the characteristics of a wicked problem, the researchers are still hesitant to call it such. This is because the characteristics of a wicked problem do not encapsulate the enormity and complexity that surrounds e-book usage. It is apparent that there is a problem: one that came into existence with the advancement of technology that changed the way in which the reader interacts with the physical format and replaced it with an apparent replication of that format. Furthermore, it will remain a problem until more research is conducted into the process of reading with electronic devices and understanding the advantages and disadvantages of such a process.

Folb, Wessel and Czechowski (2011: 226) suggested the following:

> Perhaps librarians are spending too much time thinking about information containers (print versus electronic), a library-centric way of thinking, and not about the content.

They proceed to state (using data collected from their research) that users would use the format (or 'container') that was available to them. The idea that people are more interested in the content than the 'container' or format in which it is consumed is not a new idea, and was expressed by the OCLC in 2004 (OCLC 2004). Researchers may be over-thinking and over-reacting, and while research evidence supports claims such as the negative effects of e-reading and comprehension, it has not stopped society from embracing this technology and, hence, it is safe to say that e-books are here to stay.

References

Abdullah, N. and Gibb, F. 2008. Students' attitudes towards e-books in a Scottish higher education institute: part 1. *Library Review*, 57(8): 593-605.

Ackoff, R. L. 1974. *Redesigning the future: a systems approach to societal problems*. New York: Wiley.

Al, U., Soydal, I. and Tonta, Y. 2010. Analysis of e-book use: the case of ebrary. *Proceedings of 14th International Conference on Electronic Publishing*. 16-18 June 2010. Helsinki, Finland: ELPUB. [Online]. http://eprints.rclis.org/14696 (10 November 2015).

Batie, S. S. 2008. Wicked problems and applied economics. *American Journal of Agricultural Economics*, 90(5): 1176-1191.

Brahme, M. and Gabriel, L. 2012. Are students keeping up with the e-book evolution? Are e-books keeping up with students' evolving needs?: Distance students and e-book usage, a survey. *Journal of Library & Information Services*, 6(3-4): 180-198.

Brown, L. 2009. Ebooks and the academic library: their usage and effect. MSc (Econ) dissertation. University of Aberystwyth.

Bucknell, T. 2012. Buying by the bucketful: a comparative study of e-book acquisition strategies. *Insights*, 25(1): 51-60.

Burns, D., Hyde, P. and Killett, A. 2013. Wicked problems or wicked people? Reconceptualising institutional abuse. *Sociology of Health and Illness*, 35(4): 514-528.

Cassidy, E. D., Martinez, M. and Shen, L. 2012. Not in love, or not in the know? Graduate student and faculty use (and non-use) of e-books. *Journal of Academic Librarianship*, 38(6): 326-332.

Checkland, P. and Poulter, J. 2006. *Learning for action: a short definitive account of Soft Systems Methodology and its use for practitioners, teachers and students*. Chichester: Wiley.

Churchman, C. W. 1967. Guest editorial: wicked problems. *Management Science*, 14(4): B141-B142.

Conklin, J. 2005. *Wicked problems and social complexity*. [Online]. http://cognexus.org/wpf/wickedproblems.pdf (14 August 2015).

Conklin, J., Basadur, M. and VanPatter, G. K. 2007. Rethinking wicked problems: unpacking paradigms, bridging universes. *NextD Journal*, 10(1): 1-29.

Croft, R., and Bedi, S. 2004. Ebooks for a distributed learning university: the Royal Roads University case. *Journal of Library Administration*, 41(1-2): 113-137.

Dillion, A., McKnight, C. and Richardson, J. 1988. Reading from paper versus reading from screen. *The Computer Journal*, 31(5): 457-464.

Folb, B. L., Wessel, C. B. and Czechowski, L. J. 2011. Clinical and academic use of electronic and print books: the Health Sciences Library system e-book study at the University of Pittsburgh. *Journal of the Medical Library Association*, 99(3): 218-228.

Grimshaw, S., Dungworth, N., McKnight, C. and Morris, A. 2007. Electronic books: children's reading and comprehension. *British Journal of Educational Technology*, 38(4): 583-599.

Hancock, D. 2010. *Tame, messy and wicked risk leadership*. Surrey, England: Gower.

Jabr, F. 2013. *The reading brain in the digital age: the science of paper versus screens*. [Online]. http://www.scientificamerican.com/article/reading-paper-screens/ (10 November 2015).

Jeong, H. 2010. A comparison of the influence of electronic books and paper books on reading comprehension, eye fatigue, and perception. *The Electronic Library*, 30(3): 390-408.

JISC Collections. 2009. *Headline findings from the user surveys: final report*. [Online]. http://observatory.jiscebooks.org/reports/headline-findings-from-the-user-surveys/ (10 November 2015).

JISC eCollections. 2013. *JISC Historic Books: user satisfaction survey 2012-13 report*. [Online]. http://ecollections.mimas.ac.uk/Files/JHB_survey_report_2012-13.pdf (10 November 2015).

Kreuter, M. W., De Rosa, C., Howze, E. H. and Baldwin, G. T. 2004. Understanding wicked problems: a key to advancing environmental health promotion. *Health Education & Behaviour*, 31(4): 441-454.

Levine-Clark, M. 2006. Electronic book usage: a survey at the University of Denver. *portal: Libraries and the Academy*, 6(3): 285-299.

Levy, D. M. 1997. "I read the news today. Oh boy": reading and attention in digital libraries. *Proceedings of the second ACM International Conference on Digital Libraries*. 23-26 July 1997. Philadelphia, Pennsylvania: ACM. 202-211. [Online]. DOI:10.1145/263690.263817 (14 August 2015).

Library Journal. 2010. *Survey of ebook penetration and use in U.S. academic libraries*. [Online]. http://c0003264.cdn2.cloudfiles.rackspacecloud.com/Academic%20Library%20Ebook%20Report_2.pdf (15 August 2015).

Li, C., Poe, F., Potter, M., Quigley, B. and Wilson, J. 2011. *UC Libraries academic e-book usage survey*. [Online]. http://www.cdlib.org/services/uxdesign/docs/2011/academic_ebook_usage_survey.pdf (10 November 2015).

Lincoln, T. D. 2013. Reading and e-reading for academic work: patterns and preferences in theological studies and religion. *Theological Librarianship*, 6(2): 34-52.

Liu, Z. 2005. Reading behaviour in the digital environment: changes in reading behaviour over the past ten years. *Journal of Documentation*, 61(6): 700-712.

Macedo-Rouet, M., Rouet, J.F., Epstein, I. and Fayard, P. 2003. Effects of online reading on popular science comprehension. *Science Communication*, 25(2): 99-128.

Maynard, S. and McKnight, C. 2001. Children's comprehension of electronic books: an empirical study. *The New Review of Children's Literature and Librarianship*, 7(1): 29-53.

Makin, K. 2008. *Rosemary Murray Library: eBooks survey 2008*. [Online]. http://www.murrayedwards.cam.ac.uk/files/49ede79d6b9b4.pdf (10 November 2015).

Mangen, A., Walgermo, B. R. and Brønnick, K. 2013. Reading linear texts on paper versus computer screen: effects on reading comprehension. *International Journal of Educational Research*, 58 (2013): 61–68.

Mitroff, I. I. and Mason, R. O. 1980. Structuring ill-structured policy issues: further explorations in a methodology for messy problems. *Strategic Management Journal*, 1(4): 331-342.

Nicholas, D., Rowland, I., Clark, D., Huntington, P., Jamali, H.R. and Ollé, C. 2008. UK scholarly e-book usage: a landmark survey. *Aslib Proceedings*, 60(4): 311-334.

Norton, B. G. 2005. *Sustainability: a philosophy of adaptive ecosystem management*. Chicago: University of Chicago Press.

OCLC. 2004. *2004 Information format trends: content, not containers*. [Online]. http://www.oclc.org/content/dam/oclc/reports/2004infotrends_content.pdf (14 August 2015).

Rowlands, I., Nicholas, D., Jamali, H. R. and Huntington, P. 2007. What do faculty and students really think about e-books?. *Aslib Proceedings*, 59(6): 489-511.

Ritchey, T. 2013. Wicked problems: modelling social messes with morphological analysis. *Acta Morphologica Generali*, 2(1): 1-8.

Rittel, H. W. J. and Webber, M. M. 1973. Dilemmas in a general theory of planning. *Policy Sciences*, 4(2): 155-169.

Shelburne, W. A. 2009. E-book usage in an academic library: user attitudes and behaviors. *Library Collections, Acquisitions, & Technical Services*, 33(2-3): 59-72.

Shepherd, J. and Arteaga, R. 2014. Social work students and e-books: a survey of use and perception. *Behavioral & Social Sciences Librarian*, 33(1): 15-28.

Slater, R. 2010. Why aren't ebooks gaining more ground in academic libraries? Ebook use and perceptions: a review of published literature and research. *Journal of Web Librarianship*, 4: 305-331.

Sprague, N. and Hunter, B. 2008. Assessing e-books: taking a closer look at e-book statistics. *Library Collections, Acquisitions & Technical Services*, 32(3-4): 150-157.

Springer. 2013. *Springer eBooks: eBook use and acceptance in an undergraduate institution*. [Online]. http://www.springer.com/cda/content/document/cda_downloaddocument/H6593_CB_WhitePaper_eBooks_Undergraduate+Inst.pdf?SGWID=0-0-45-1370809-0 (2 April 2014).

Underwood, P. G. 1996. *Soft systems analysis and the management of libraries, information services and resource centres*. London: Library Association.

University of Liverpool eBook Study. 2010. *A survey of ebook usage and perceptions at the University of Liverpool*. [Online]. http://resource-cms.springer.com/springer-cms/rest/v1/content/20840/data (10 November 2015).

Walters, W.H. 2013. Ebooks in academic libraries: challenges for acquisition and collection management. *Libraries and the Academy*, 13(2) 187-211.

Zhang, Y. and Beckman, R. 2011. E-book usage among chemists, biochemists and biologists: Findings of a survey and interviews. *Issues in Science and Technology Librarianship*, (65): Article 2. [Online]. http://www.istl.org/11-spring/article2.html (10 November 2015).