

JISC User Behaviour Observational Study

Scholarly digital use and information seeking behaviour
in business and economics

An evidenced-based study

CIBER

University College London

<http://www.ucl.ac.uk/infostudies/research/ciber/>

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Executive Summary

The report covers the digital usage and information seeking behaviour of tens of thousands of business/economics/management students, researchers and academic staff. The intention was to inform and provide a context for the small-scale but detailed observational and interview studies undertaken by Middlesex University researchers. Much of the data were mined from CIBER's Virtual Scholar research programme and has not been previously published in this form. New data was also obtained from the studies CIBER are currently conducting, especially from the JISC national E-book Observatory project and the RIN funded E-journals study. Log data, the main source of information on usage and information seeking, covers a period of more than five years and the questionnaire data represents more than 5000 people so this probably represents the biggest and most comprehensive usage data set ever assembled on the subject. E-books and e-journals are covered and usage at the three JISC case study institutions – LSE, Middlesex and Cranfield, are highlighted. A whole variety of analyses are featured including: volume and, patterns of use (in terms of visits and page views), dwell time (session and page times), type of content viewed (PDF, abstracts etc), number of pages viewed in a session, methods of navigating towards content, age of material viewed, and number of searches conducted, names of titles used, user's organization, age and gender, hardcopy v digital preferences, viewing/reading behaviour.

The main findings are that Business/Economics students and academic staff use and seek information very much like their virtual colleagues in other subject fields. That is they make characteristically short visits, which see only a few pages and documents viewed; they like simple searching, use Google and GoogleScholar and like browsing when they get to a website; they appreciate searching off-site and outside the traditional (9-5) working day. E-

textbooks are mainly used for obtaining snippets of information and fact finding. Power browsing of multiple e-text books is characteristic and there appears to be very little extended reading of e-books. Students are the majority users of digital information services, because there are simply many more of them - their use however is much lighter as they tend to view fewer pages. As with all subject fields, there are considerable institutional differences between the usage and information seeking behavior even within discipline, with those at research intensive institutions using the databases more - although spending less time on a visit, and using less of the functions on offer.

Economists/Business users are also distinctive in their use and information seeking and their key characteristics are: a) they are heavier users of e-textbooks and e-books generally; b) they tend to search off campus and out of office hours more (the fact that many are part-time provides part of the explanation); c) their searches and visits are even more abbreviated than the virtual scholar norm - they are the archetypal 'bouncers'; d) Google and GoogleScholar is even more popular, as too is abstract viewing; e) they have a marked preference for current material.

Of the three case study institutions LSE was clearly the super-user both in terms of e-books and e-journals, making more visits and viewing more pages. This is a characteristic of top-rated research driven universities¹ everywhere. However, abstract viewing was lowest at the LSE and highest at Cranfield.

¹ <http://www.rin.ac.uk/use-ejournals>

1.0 General Aims

The aim of this report is to inform and provide a context for the observational element of the JISC funded User Behaviour Observational Study (Business and Economics) which sought to ‘demonstrate the issues that real users (students and researchers) face when navigating the Web and interacting with scholarly resources’. This was undertaken by furnishing Business and Economics digital usage and information seeking at a national and international level.² Something the literature review confirms has never been undertaken before. This was largely achieved through mining the Virtual Scholar programme evidence base built up by the CIBER research group during the past seven years³. The evidence base is formed from data from a four major projects, which employed deep log and questionnaire methods, and the details of these projects follow (summary data can be found in Table 1).

1. The JISC National E-books Observatory (November 2007 to March 2009)⁴.

The importance of this project for the current research project is that: i) it covers Business management; ii) it is probably the biggest study ever conducted on the information seeking behaviour of UK university students and certainly the biggest study of scholarly e-book use; iii) the data are very current. Specifics:

- a. Contributes detailed digital ‘footprints’ (logs) of students and staff from 127 UK universities in respect to their use and information seeking in connection with 5 e-business management textbooks on the MyiLibrary system. These footprints include information on: a) volume and duration of use; b) where use took place; c) book titles used; d) date and time of searching; e) type of page viewed; f) where the user arrived from (referrer link). The unique character of

² <http://www.jisc.ac.uk/whatwedo/programmes/inf11/userbehaviourbusandecon.asp>

³ <http://www.ucl.ac.uk/infostudies/research/ciber/>

⁴ <http://www.jiscebooksproject.org/>

business management usage and seeking is established through comparisons with other subject fields. Diversity is also explored through a number of individual university comparisons.

- b. Provides tabulated questionnaire data from entry and exit surveys for staff and students in the business management field at the 127 universities regarding: a) degree of e-book use; b) propensity to buy/source from a library/surf the net, etc; c) screen/paper preferences; d) session length; e) amount of text read (e.g. whole chapter/book or skim); f) frequency of e-book use and whether it is growing; g) frequency of use of library (physical / virtual) and purposes of visit; h) satisfaction levels with hard copy provision; i) off campus use of the digital library. Data are segmented by type of university, age, gender and status (in regard to latter, differentiating between staff and student behaviours)
- c. Offers insights into the e-book behaviour and attitudes of business students and faculty from an analysis of more than a thousand free text comments furnished as part of the questionnaire surveys mentioned above

2. Evaluating the usage and impact of e-journals in the UK. Funded by the Research Information Network, 2008-2010⁵

The importance of this project for the current study is that: i) it covered Economics; ii) it is the biggest study conducted of the use of e-journals by UK researchers and students; iii) the data are very current; iv) institutional diversity was investigated. Details:

- a) Part of this study furnished data on the use and information seeking behaviour of 151 Economics journals on the ScienceDirect and Oxford Journals databases.

⁵ Full report at <http://www.rin.ac.uk/use-ejournals>

- b) It was a log based study and covered researchers (students and staff) from 10 UK research institutions, mostly universities. Comparative data for other representative subjects provided.

3. Authors as users. Funded by Elsevier; 2005-2006⁶

The importance of this project is that it covered: a) Economics authors (as defined by the user and the subject of the journals used); b) a very wide range of information seeking characteristics. Details:

- a) Furnishes deep log analysis conducted over a period of 18 months of 30 international Economists
- b) Links demographic and attitudinal data obtained from a questionnaire with usage data from ScienceDirect journals.

4. MaxData study⁷

The importance of this project is that it covered: i) a very large population of students; b) a very large number of Economics/business e-journals – over 1000. Details:

- a) Includes an exploratory deep log analysis of Economics and Business journal usage on OhioLINK, conducted as part of the MaxData project funded by the US Institute of Museum and Library Services. OhioLINK, the original “big deal”, provides a single digital platform of nearly 6,000 full-text journal for more than 600,000 people in the state of Ohio.

Table 1: Research project specifications

⁶ Unpublished report at <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/>

⁷ Full report at <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/>

Project name	Subject coverage	Type of documents covered	Period of coverage	Methods employed	Nature and size of subject population
JISC National e-books observatory (NEBO)	Business management with comparisons to Engineering & Media studies	5 business textbooks with comparisons to 10,000 others	11/2007 – 03/2009	Log analysis & questionnaire (closed and open questions)	a) largely students, with some academic staff; b) 127 UK universities; total number of subject users unknown but 5519 questionnaire respondents
RIN e-journal study	Economics with comparisons to Chemistry, Environmental science, Life Science, Physics & History	151 economics journals with comparisons to 1334 others	Science Direct 01/2007 – 04/2007 Oxford Journals 01/2007 – 12/2007	Log analysis	a) researchers, including students, PhD students and academic staff; b) 10 UK research institutions total user numbers unknown but in the thousands
Elsevier Authors as users study	Economics with comparisons to other subjects	130 Economics journals plus 1200 others	18 months (11/2003 - 5/2005)	Log analysis & questionnaire	a) academic staff researchers; b) 30 international Economists
MaxData study	Business and Economics compared to other subjects	1100 Business journals plus 4000+ others	15 months 1/2005-4/2006	Log analysis	a) largely students but also academic staff b) exact numbers unknown but in the thousands b) 4 US universities

2.0 Scope

While the four research projects were all part of the same research programme (The Virtual Scholar programme), conducted by the same research team using a very similar, bespoke, deep log methodology the scope and coverage of the projects did differ in some important respects:

1. **Subject.** It should be noted that various definitions of the case study field (Business and Economics) have been used in the studies included in this report and this is highlighted in the project descriptions. In order to fully understand usage and information seeking behaviour in Business and Economics, it is necessary to compare it with usage and behaviour in other subject fields, and this is undertaken widely throughout the report.

2. **User population.** Students and researchers are the focus of the current JISC study. In the case of the log studies it was not always possible to identify whether the user is a student, member of staff etc and thus some of the data mined covers a wider user population and this is highlighted in the project descriptions that follow.
3. **Time period.** Given the rate of change and volatility (churn) in the field it was decided to only mine studies undertaken since 2005. Even so the actual data drawn from the four projects encompasses different periods from 2003 – 2009.
4. **Country.** The observational strand of the current project covers UK students and researchers. The CIBER studies were more international in scope, although the NEBO and RIN studies are exclusively UK studies and this is again pointed out in the project descriptions

3.0 Literature review

What is perhaps surprising given the size of the scholarly business and economics community and their clear need for information is the fact that there have been very few recent (2005 -) studies of business/economics e-journal usage, other than the CIBER studies reported here. One of the few is a study by Evans and Peters (2005) that sought to discover how usage was distributed over Emerald's 108 Business and Management journals. These titles attracted nearly 6.5 million 'downloads' in 2004, demonstrating how popular journals are in the field. Around 10% of the titles accounted for around 30% of use and around 47% accounted for 80% of use, which, in relative terms, meant that use is quite well distributed over the Emerald portfolio. Much higher levels of concentration exist in subjects like Physics and the Life Sciences.

There is however a much more healthy literature on business/economics e-books, which in itself is probably significant – business e-books are a potentially important and exciting asset. Generally, the published literature shows that business is among the most used subjects in terms of e-book usage. A survey of a representative sample of 470 full-time American students representing 250 colleges showed that 26.9% of respondents from the (admittedly broad) subject category of “**Business, Economics, Finance, Engineering, Math**” agreed with the statement “I use the library e-book collection occasionally” (Primary Research Group Inc., 2009). Levine-Clark (2007) found some subject differences in terms of frequency of use; humanities (13.8 percent), **business** (13.3 percent) and social science (13 percent) faculty were the most frequent users of e-books; in contrast the figure was just 11.8% for the science faculty. A study of NetLibrary usage data for Auburn University Montgomery between 2000 and 2004 showed that books in the subject “**Business, Economics and Management**” were the most

used titles with 1580 total accesses during the period. In total, 703 individual business titles were used (Bailey, 2006).

A survey of 2084 students and staff at two Australian universities showed that 62% respondents from **business** said they used e-books. (Borchert et al., 2009). Dillon (2001a, b) at the University of Texas Austin examined usage reports for electronic books and found that books on **Economics and Business** received higher usage than e-books in most other subject areas. The study also found that these results were consistent across the various collections. Langston's (2003) study concerned an electronic book pilot project in cooperative collection building undertaken by the California State University (CSU) system. Covering a total of 23,000 NetLibrary titles in two collections (one leased and the other purchased), the study found that the most accessed subject area in the leased collection was **economics and business**, which accounted for 39% of all accesses.

An examination of NetLibrary usage reports for Simmons College over the period (2001–2006) showed that the top six disciplines and subjects included **business, economics, and management** (1,785 visits); general social sciences (1,558); medicine (705); computer science (660); literature (559); and library science and publishing (537) (Hernon et al., 2007). Finally, a study of e-book usage statistics supplied by three e-book providers (including NetLibrary and Ebrary) at the University of Idaho in 2008 showed that the highest usage of e-books occurred in the category "**Business/Economics**". 1186 titles in this subject were used (total 3425 uses), which was equal to 17.4% of all titles in the subject that the library held. It should also be noted that the library held 6836 titles in this subject category which was more than library's holdings in any other subject. (Hunter and Sprague, 2009)

3.1 Main points arising from the literature

- There is a clear consensus in the literature that business/economics scholars are the biggest users of e-books, especially students
- Use of e-journals is a relatively under-researched area and hence the importance of the present study
- Use of e-journals is relatively widely distributed over a large number of titles

4.0 Results

4.1 Use and information seeking in respect to e-textbooks by business management students and staff in the UK. JISC National E-books Observatory (NEBO)⁸

4.1.1 Introduction

The general aims of the project were threefold:

1. To license a collection of e-books that are highly relevant to UK HE course taught students in four discipline areas:
 - a. Business and Management Studies
 - b. Engineering
 - c. Medicine (not mental health or nursing)
 - d. Media Studies
2. To evaluate the use of the e-books through deep log analysis and the impact of the free at the point of use materials upon publisher, aggregator and library processes
3. To transfer knowledge acquired in the project to publishers, aggregators and libraries to help stimulate an e-books market that has appropriate business and licensing models

Data were collected on e-textbooks during the period November 2007 to March 2009 for business management students and staff by three methods: 1) log analysis of titles on MyiLibrary platform; 2) questionnaires; 3) focus groups. Data were collected from 127 UK universities in regard to general digital use and information seeking as well as that regarding specific

⁸ Full report at: <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/>

Business e-books that JISC provided for the purposes of Observatory. These books were:

Blyton & Turnbull, *The Dynamics of Employee Relations*, Palgrave Macmillan, 2004 (3rd ed.).

Hannagan, *Management Concepts & Practices*, Pearson Education, 2004 (4th ed.).

Hooley, Saunders & Piercy, *Marketing Strategy & Competitive Positioning*, Pearson Education, 2003 (3rd ed.).

Pickton & Hudson Broderick, *Integrated Marketing Communication*, Pearson Education, 2004 (2nd ed.).

Rollinson, *Organisational Behaviour and Analysis: An Integrated Approach*, Pearson Education, 2004 (3rd ed.).

4.1.2 Results of log analysis

Business e-books proved to be the most popular titles. Of the three subjects covered (the two other subjects were Media studies and Engineering) Business e-books received the highest volume of use. The five Business titles (constituting 20% of the JISC e-books) accounted for 45% of page views; this represented around 342,450 views. Their popularity could be put down to a number of factors: a) the books were more attractive to university users; b) the nature of business studies means that e-books are especially attractive, and the literature suggests that this is the case; c) staff and librarians promote them more; d) there were more students studying Business/Management in the UK. In 2007/8 there were 40,425 students compared to 34715 for Engineering and 8730 for media studies

The most popular JISC title was in fact a business title *Organisational Behaviour and Analysis: an Integrated Approach*, which attracted 82,787 page views in the 14 month survey period. The third, fourth and fifth most used titles were also Business titles and all attracted more than 74,000 views. The book that increased its use most over the survey period was

Integrated Marketing Communication, its use increased from about 14% of business use (December 2007) to 37% (May 2008).

Use was unusually strong in August. In relative terms Business e-book usage was strongest in August 2008 when it accounted for 63% of all JISC e-book use and was weakest between February and April 2008 and accounted for less than 40% of views. Normally use of e-books are tied to teaching but perhaps not so in the case of Business?

Business books were viewed for a relatively longer time. All e-book use is relatively brief but relatively speaking Business e-textbooks obtained more attention. Thus while most e-book pages were viewed for less than a minute a higher proportion of Business pages (17%) were viewed for more than a minute.

Business online sessions tended to feature a high number of page views and lasted longer. Nearly a third (31%) of sessions recorded significant levels of use with 11 or more pages being viewed. Sessions where Business titles only were viewed were longer: 59% lasted more than 12 minutes compared to 51% for sessions where Engineering and Media studies books were viewed. Fewer Business sessions lasted under 30 seconds, which probably meant most users were finding something of interest.

Cover pages, unexpectedly, were viewed for the longest time and perhaps this was what we might call 'dwell' time, when users make relevant judgements or trying to get a fix on things (orientation).

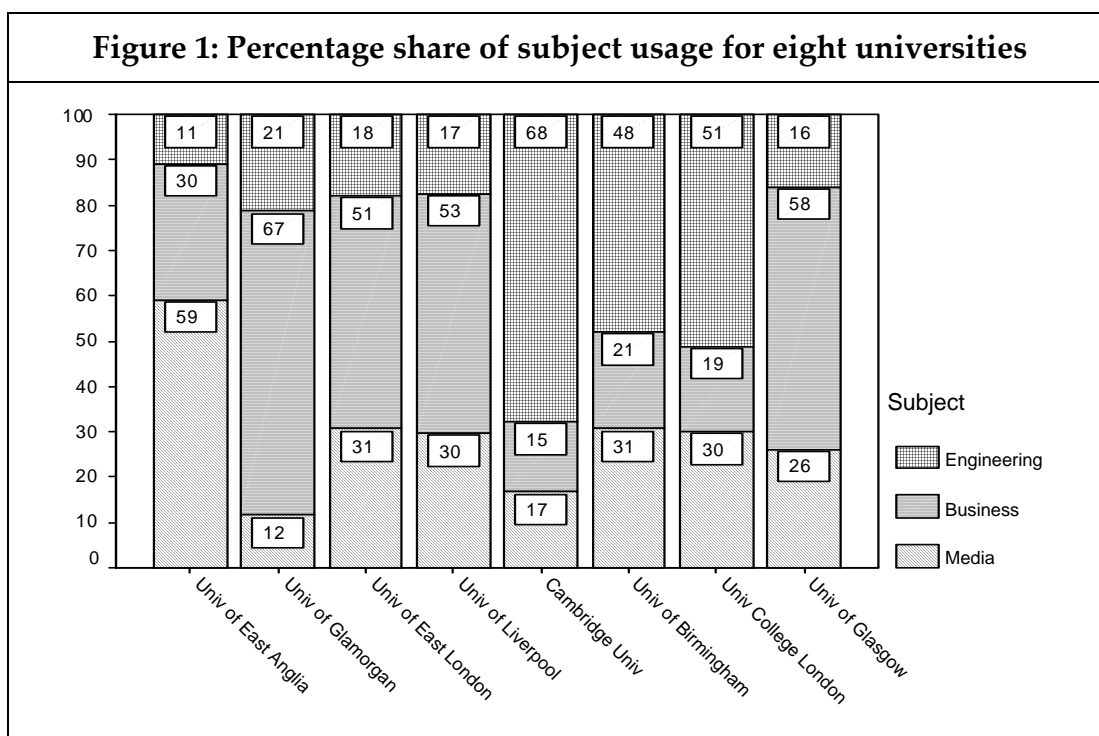
Much e-book use occurred off campus. A much higher proportion of Business e-book sessions were conducted off-campus. Thus, while a third (32%) of UK

on-campus sessions viewed a Business title this was true of nearly two-thirds (61%) of off campus (UK) and three quarters of overseas use.

Business users like using search to navigate towards e-book content. Thus sessions viewing a Business title were about twice as likely to have used a search expression. In general, those people using the search facility were more likely to view more than one e-book in a session and were also more likely to view more content pages in a session; the two tend to go hand in hand, of course. Sessions using a search facility were more likely to view over 20 pages, and this could be due to the scatter gun approach of search.

Business users accessed e-books via virtual learning environments (VLE) much more frequently than users from other subjects: 305 sessions arose from a VLE as opposed to 74 for Engineering and just 50 for Media Studies. It has to be said though accesses via VLE's were low generally.

The big Business users. Figure 1 gives the subject share of usage for eight case study universities. At Glamorgan two thirds (67%) of usage went to Business titles. The University of Glasgow followed with (58%), and at both the University of East London (51%) and the University of Liverpool (53%) over half of use was to Business titles.



Performance of user observational case study universities. Of the three universities participating in the JISC user observational case study, Cranfield, with 7074 page views, was by far the heaviest user of JISC e-books (Table 2); LSE was the heaviest user of MyiLibrary e-books generally; Ironically, Middlesex hardly registered at all in terms of e-textbook use.

Table 2: JISC Business Observatory case study universities ranked by MyiLibrary e-book use

	Non-JISC e-book		JISC e-books	
	Usage	Rank by usage where 1 is highest	Usage	Rank by usage where 1 is highest
Cranfield University	2033	77	7074	21
London School of Economics and Political Science	212845	2	4426	40
Middlesex University	57	108	722	107

If we just concentrate on the Business use at the above institutions we find the following⁹:

- Marketing strategy and competitive planning proved to be the most popular book except in the case of Cranfield where Integrated Marketing Communications was the most used title;
- Use for individual titles peaked in different months and this was also different for each of the three universities – no pattern in other words. Thus, take Marketing Strategy and Competitive Planning, in the case of Cranfield most use took place in August, for LSE it was January and in the case of Middlesex it was July.

Table 3: Use of JISC business titles by month for Cranfield (2008)

Title	J	F	M	A	M	J	J	A	S	O	N	D	Total
Dynamics of Employee Relations	47	4	0	0	6	5	0	1	0	0	1	0	64
Integrated Marketing Communications	27	207	7	0	0	3	0	0	0	7	1724	143	2118
Management Concepts and Practices	15	26	73	19	28	7	10	8	1	7	84	43	321
Marketing Strategy and Competitive Positioning	3	43	0	5	5	4	1	105	0	14	18	63	261
Organisational Behaviour and Analysis	2	29	31	9	21	1	0	3	62	4	8	3	173

Table 4: Use of JISC business titles by month for LSE (2008)

Title	J	F	M	A	M	J	J	A	S	O	N	D	Total
Dynamics of Employee Relations.	0	3	0	0	2	0	0	0	3	34	20	27	89
Integrated Marketing Communications	6	1	97	8	20	2	14	20	0	0	0	0	168
Management Concepts and Practices	0	0	0	0	50	0	0	0	0	0	1	21	72
Marketing Strategy and Competitive Positioning	427	0	201	0	1	0	2	0	0	15	218	182	1046
Organisational Behaviour and Analysis	0	8	10	0	0	7	36	44	0	5	36	0	146

⁹ These are COUNTER figures and note the figures on cover 12 months

Table 5: Use of JISC business titles by month for Middlesex (2008)

Display Title	J	F	M	A	M	J	J	A	S	O	N	D	Total
Dynamics of Employee Relations	0	0	0	0	0	0	0	38	0	0	0	0	38
Integrated Marketing Communications	0	0	0	0	4	0	5	0	0	18	0	0	27
Management Concepts and Practices	0	0	0	4	0	0	0	12	0	4	19	15	54
Marketing Strategy and Competitive Positioning	0	8	6	25	0	0	50	0	0	7	0	4	100
Organisational Behaviour and Analysis	1	0	14	0	0	0	0	11	0	1	3	4	34

There was a relatively high concentration of use. Thus, in the case of Management Concepts & Practices the top ten (of 127) universities accounted for 36% of its use. The University of Glamorgan was the biggest user by some distance and viewed the title 3455 times (8% of all page views).

E-book at the case studies tended to be related to and restricted by the teaching rhythms of the year and these clearly differ from university to university, explained, perhaps by the fact that modules run at different times of the year. Figure 2 demonstrates this by showing the monthly use of Management Concepts & Practices by three universities: Liverpool (3rd biggest user), Queen Mary (5th) and Manchester Metropolitan (2nd). For Liverpool use was more spread out over the period and peaked in December 2008. Use at Queen Mary was high January and February 2008, dropped considerably until December 2008. Manchester Metropolitan hardly recorded any use until October 2008 when it went through the roof; use then continued at more modest, but still significant levels.

Figure 2: Monthly use of Management Concepts & Practices by three universities

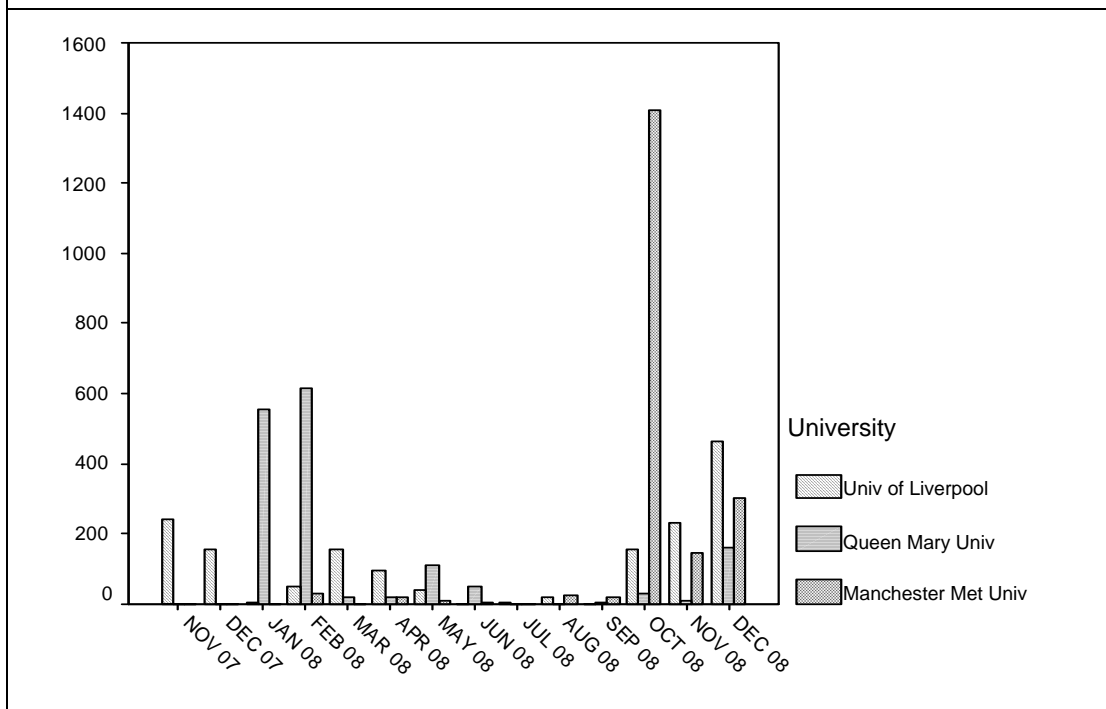
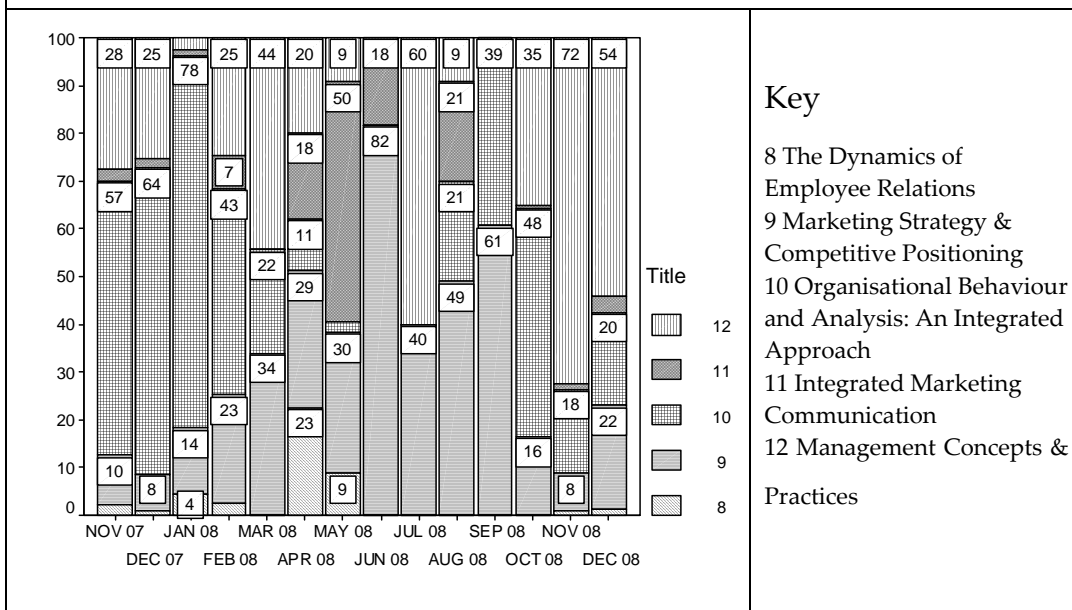


Figure 3 shows the variation in use of Business titles for the University of Liverpool. Organisational Behaviour and Analysis made up over half of Business title use between November 2007 and February 2008. Integrated Marketing Communication made up half of use in May while Management Concepts & Practices made up half of use in November 2008 and December 2008.

Figure 3: Percentage share of e-book use for Liverpool across month – Media JISC sponsored titles only



4.1.3. Questionnaire analysis (closed questions)

An ‘entry’ questionnaire survey was undertaken at the beginning of the study during January/February 2008 and this was followed by an ‘exit’ survey in January/February 2009. The survey was open to all 127 universities. Altogether 52,156 academics (staff and students) responded to the two questionnaires. We do not know whether the people filling in the first questionnaire also filled in the second questionnaire. The data were analysed using SPSS. We have pulled together the data for the two studies in the following analysis.

Who was using the Business and Management books and recommending them?

Fourteen percent (5,519) of students who took part in the combined entry and exit survey described their subject interests as Business and Management. Not surprisingly they accounted for virtually all (96%) of the use of the five Business and Management books.

Ten percent (394) of the university staff who took part in the surveys described their teaching interests as Business and Management. Recommendations of the individual JISC Business titles from staff ranged from 11.4% and 21.1%. (Individual title data follows). Ninety-nine percent of the recommendations for the five Businesses and Management texts came from staff describing their teaching interests as Business and Management.

Are Business and Management students and staff distinctive in their use of e-books?

Sixty nine percent of the Business and Management students from the surveys said they had used e-books against 68% for Engineering, 63% for Media Studies and other subjects and 56% for Medicine. Not only were Business students more likely to use e-books, their use of them was increasing at a higher rate. Thus, take-up of e-books increased from 66.6% to 71.4% (a growth rate of nearly 5%) between the two surveys. In comparison the growth figures for the other subjects were as follows:

- Engineering - growth rate 1.1%
- Media studies – growth rate 3.5%
- Medicine – growth rate *minus* 0.6%
- Other subjects – growth rate 2.9%

Interestingly, Business lecturers on the other hand used e-books less than their academic colleagues from other subjects. Thus 59% had used e-books while the figure for Media studies was 70%; only medical academics used them less (53%). Business lecturers' use of e-books, however, increased by nearly 5% between the two surveys; even so this growth level was eclipsed by that of medical staff (nearly 7%).

Individual university performance

The three JISC user observational case study institutions performed pretty poorly in the questionnaire studies regarding response rates of business staff and students: LSE (1 response), Cranfield (28) and Middlesex (2). This could be due to the fact that the questionnaire was not promoted as much as at other universities or academics in these universities were less interested in e-books.

The Business and Management e-texts

In the exit survey 13.8% of business and management students (n=2,892) said they had used one of the JISC business and management texts in e-book form.¹⁰ The performance of the individual titles is as follows:

a) The Dynamics of Employee Relations

Used by 511 students in the entry survey and 572 in the exit survey. The title was recommended by 11.4% of Business and Management staff with 6% strongly recommending it. Recommendations increased by 2.2% between surveys, strong recommendations by 4.3%

b) Marketing Strategy and Competitive Positioning

Used by 559 students in entry survey and 870 in exit survey. The title was recommended by 13.8% of Business and Management staff with 7.5% strongly recommending it. Recommendations increased by 10% between surveys, strong recommendations by 7.6%.

c) Organisational Behaviour and Analysis

This was the top book: used by 955 students in the entry survey and by 1,068 in exit survey. It was also the most strongly recommended e-book. Thus, it was recommended by 21.1% of Business and Management staff with 11.2% strongly recommending it. Recommendations increased by 6.8% between surveys, strong recommendations by 3.6%

d) Integrated Marketing and Communication

¹⁰ the entry survey did not ask this question

Used by 660 students in the entry survey and 737 in exit survey. It was recommended by 16.2% Business and Management staff with 9.7% strongly recommending it. Recommendations increased by 5% between surveys, strong recommendations by 4.5%

e) Management Concepts and Practices

Used by 667 students in the entry survey and 740 in exit survey. It was recommended by 16% of Business and Management staff with 8.6% strongly recommending it. Recommendations increased by 0.7% between surveys, strong recommendations by 2.9%

General e-book information seeking behaviour

Big users of e-books. Business and Management students were the most frequent users of e-books with 19.4% reading more than 5 titles in the past month as opposed to 19.2% for Engineering students, 15.9% for Media Studies, 11.7% for Medicine and 15.2% for Others.

Time spent viewing e-books. Business and Management students shared information seeking habits with the other subjects in terms of time spent reading e-books with 39.2% of those from Business and Management and other students saying they spent more than 20 minutes a time. Similarities were shared across the scale with around 35% spending 11-20 minutes, with down to 1.4% at less than 3 minutes.

Amount of e-book used. Business and Management students showed some differences in terms of the proportion of e-books read. The whole book was read by around 5% for both Business and Management and students from the other subjects. For whole chapters however, Business and Management students showed a higher proportion at 22.6% compared to 18.5% for other student who, in turn, showed higher rates of reading one chapter or dipping in and out of several.

Obtaining e-books. Business students were the least likely to have bought their own copy of a textbook or to have obtained one from the open web. They showed the strongest tendency of any of the subject groups to use library-provided e-books. This tendency was noted before the National E-books Observatory project took wing, so e-books appear to satisfy a real need. In general terms business students were very frequent visitors to their university digital library.

General demographics of Business students. Female students, perhaps surprisingly, outnumbered men in Business studies, as in many other subjects today, by a significant margin. As might be expected, given the nature of the subject, Business studies courses contain a relatively high proportion of part time students: to a much greater extent than the three other subjects covered by the JISC Collections e-books experiment.

Hard-copy use. Business students were much more likely to be dissatisfied with the level of print textbooks available to them. Whether this is a perception (they are keen library users) or a more objective reality we cannot say from the survey alone.

Location of access. As might be expected given the high proportion of part time business students represented in the survey, business students prefer to access their university's digital offerings mostly or entirely from home.

4.1.4 Questionnaire study (open ended questions)

In the case of both the entry and exit questionnaires there was a catch-all, open-ended question: "Is there anything that you want to add regarding course texts, print or electronic, or about your university library?" There were 1,574 free text responses from Business staff and students of which 520

responses, due to ambiguity, could not be attributed to a specific or relevant e-book topic. 1,054 responses remained of which 481 originated from the entry survey and 573 from the exit survey. The attraction of such data is that it is given freely with prompting and direction and, possibly, provides a better idea of what staff and students really think about e-books.

General impressions

61.4% of respondents offered positive opinions or experiences in regard to e-books. There was a significant improvement in positive e-book opinion between the two surveys, from 58.1% - 63.7%. Of course, it is possible for a respondent to offer both a positive and negative opinion at the same time (e.g. “e-books are a great idea but using them is cumbersome...”) In fact, 7.4% of respondents offered a mixed opinion and these people can be thought of as ‘floating voters’ who, if their concerns were addressed could become positive e-book users.

Examples of positive opinions proffered:

- One citing academic outcomes: “The e-books service provided by my university has been very useful and play crucial role on my studies.”
- One on unblocking access: “The more e-books the better since more students can use them at the same time!”
- One on portability: “I now own a Sony portable reader - this has revolutionised my reading habits. I find that being able to transport 160 e books in one device invaluable. I read on trains and in cafes.”
- One on remote access and academic outcomes: “E-books are a VERY good tool - you don’t have to worry about the availability of a certain book and they are also useful to me as I have to travel for an hour to get into Uni, so cutting out this journey to the library by accessing the book online is extremely useful to me and gives me more study time.”

Examples of negative comments offered

- One on printing difficulties: “e-books are a great idea but using them is cumbersome and you can only print limited pages in many so limited use and frustrating
- Two on reading problems: “I find e-books really useful for core reading when specific chapters are suggested but find it difficult to read whole books on screen”. “I have noticed that most people find it very difficult to read books and journals online. Most students tend to print the material and then read it.
- One on their cumbersomeness “Accessing e-books although very convenient (I can access at 3 am if I want to) is time consuming and quiet fidgety. If I had the option I would much rather have a book in hand.”

The most common issues

The most common issues raised, receiving more than 50 responses, were in rank order:

- Problems of getting hold of hard copies from library or other sources.
- Need for more e-book titles. A quarter of respondents mentioned this.
- Difficulties of access
- Difficulties of reading
- Preference for hard copy.
- Poor promotion.

Focus on access issues

Problems in accessing e-books accounted for 13.3% of comments. Those under 25 years in age tended to have less access worries. Thus just 11.7% of their comments concerned access problems, whereas the figure for the 36-45 year olds was 20.8%.

The following access aspects could be identified.

- Technical issues with software or hardware. E.g. “Do e-books work with Macs - tried it with Safari and Firefox without success?” “My university library provides e-books, but they only open in internet explorer, whereas my default browser is Firefox. Making it compatible would be great.” “I have often tried to access e-books through the university online resources and have found some interesting titles; however when I have attempted to read them, the internet explorer crashes and closes it down, so i am unable to read them.”
- Problems with remote access. E.g. “Have never been successful at accessing electronic print from home I cannot access the university e-books from home”. “I can only use them at University. I would use them a lot more if I could access at home.” I can't use my Athens password because every time it says “there is a mistake in the Athens number” It drives me potty when I am accessing e-books at home that you get logged out of the system every 15minutes for security reasons.
- Timeouts. E.g. “I am not very satisfied with the electronic library provided by my university.” “I have to log on myself each 5 mins, it is not very convenient if I need to read and take note at the same time.” “I noticed that when reading a chapter of an e-book on-line it timed out and I had to reload the book and find where I was and this was an inconvenience to me.”
- Printing restrictions. E.g. “I find the ability to only print 5 pages at a time is very time consuming and frustrating. I realize it's for copyright purposes, however, if it is intended to be used as a resource, it really should be more user-friendly.” “While I like the idea of e-books, they are not useful if you cannot print however much you want from them, and are not user friendly to scroll through.”

- Limitations on multiple user access. E.g. “I have recently discovered when using the electronic books that there is a limit as to how many people can be accessing them at any one time. This can be rather inconvenient when it has been set as a book/chapter to read for a particular lecture.” “Not enough electronic copies!! Have to sit for hours online until they are available.” “The availability of e-books is sporadic and just like going into a standard library, if two users are trying to access the same book at the same time on a network, it doesn't allow access to the book for one of them, which is bad.”
- Interface issues. E.g. I use ebrary; I find the navigation clunky and unintuitive. The technology needs to move into the 21st century! The current form of electronic books offered by the university are HIGHLY unusable and impractical. Opening pages one by one is time consuming and does not fit for intensive use

4.1.5 Focus groups

The purpose of the focus groups was to gain a deeper understanding of the ways in which e-textbooks were used by students and academic staff in UK Universities in order to enrich and enhance the log data collected from the MyiLibrary site and reported in section 4.1.2. Separate focus groups of students and academics staff (of between 2-8 people) were held at 10 of the universities involved in the Observatory experiment. Just over 50 people were interviewed in all. The relevant results of the focus groups for this study are:

1. There was not much subject diversity, but the relatively low numbers of people interviewed might be a factor in this.
2. E-textbooks were mainly used for obtaining snippets of information and fact finding. There appeared to be very little extended reading of e-books

3. Not unexpectedly high value was placed on the interactive features of e-textbooks, and also on the facility to search for information.
4. Power browsing of multiple e-text books was characteristic, a function of massive choice.
5. The e-book user was easily distracted and confused by the myriad navigational routes and display options, and the ability to move out of the e-book environment with ease and at will. It also has to be said that the MyiLibrary interface is not a particularly intuitive one.
6. The most important reason for using e-books was convenience - of transporting and accessing them.
7. E-books were used for a wide range of academic purposes and none predominated suggesting that function (e.g. searching for quick facts) or convenience may be more important than task.
8. The library catalogue/OPAC was the main means of accessing e-textbooks. There was low use of Virtual Learning Environments but higher use of e-reading lists as routes to e-books. Federated search appears to be not much used and unimportant to students trying to locate e-textbooks. The multiple routes to e-books confused students.
9. E-textbook content was mainly and equally accessed via search and tables of contents. Advanced searching, as found to be universally the case, and the expanding of the table of contents were almost never used.
10. There was little sustained reading of the e-textbook online. The preference was to print out material, of course something not made easy by the e-book platforms.
11. Business students were more conscious of the currency (or otherwise) of the e-textbooks, one student explaining that *What I found was, in each and every new editions, we have more case studies which are very recent and relevant and up-to-date. So it's nice to have up-to-date information in hand.*

4.1.6 Main points arising from the project

- The results of this study confirms what we have found in the literature that business students particularly are the major and most significant users of e-books in that they view them more frequently, spend longer viewing titles and undertake much busier and intensive sessions. The most popular JISC title was in fact a business title, attracting over 80,000views in 15months. The book that increased its use most over the survey period was also a business title.
- There was a relatively high concentration of use in respect to the JISC e-books. Thus, in the case of Management Concepts & Practices the top ten (of 127) universities accounted for 36% of its use.
- Business students were the least likely to have bought their own copy of a textbook or to have obtained one from the open web. They showed the strongest tendency of any of the subject groups to use library-provided e-books.
- A high proportion of e-book use came from the newer universities (and this was true for other subjects too) Of the three universities participating in the JISC user observational case study, Cranfield was by far the heaviest user of JISC e-books – it has a big business school.
- Use was unusually strong in August, which is unusual because much e-textbook searching is tied to the rhythms of the teaching year. Could be an indicator of project and postgraduate use.
- Business e-book users tend to search off campus (many were part-time and this provides part of the explanation) and are more likely to access the books via Virtual Learning Environments
- Business users liked using search to navigate towards e-book content. The library catalogue/OPAC was the main means of

accessing e-textbooks. Federated search appears to be not much used and unimportant to students trying to locate e-textbooks. Multiple routes to e-books confused students.

- The e-book user was easily distracted and confused by the myriad navigational routes and display options, and the ability to move out of the e-book environment with ease and at will. Advanced searching was hardly ever used though.
- E-textbooks were mainly used for obtaining snippets of information and fact finding. Power browsing of multiple e-text books was characteristic, a function of massive choice. There appeared to be very little extended reading of e-books
- The most important reason for using e-books was convenience - of transporting and accessing them.
- The main problems encountered were: a) lack of e-book titles. b) access and navigation; c) reading electronic text; d) poor promotion.

4.2 Use and information seeking behaviour of UK academic economists (including students) in connection with e-journals. Research Information Network funded project ‘Evaluating the usage and impact of e-journals in the UK’

The relevant aims of the study was to provide a detailed analysis of how academic researchers in the UK have responded to the provision of scholarly journals in digital form, and how this has shaped their information-seeking behaviour and their use of such journals. The objectives were to: a) investigate researchers’ behaviour, in terms of levels and patterns of usage, content viewed, navigational preferences, and routes used to access e-journal content; b) ascertain how researchers’ behaviours vary by subjects and disciplines, and in relation to the universities and other institutions in which they work. We shall focus on the study of use and information seeking behaviour of 151 Economics journals from ScienceDirect and Oxford Journals by UK researchers – lecturers, research staff and students. It was conducted during 2007/8. It was a log based study and covered researchers from 10 UK research-led institutions, mostly universities.

4.2.1 ScienceDirect

The following analyses examine use and information seeking behaviour from an institutional perspective and demonstrate that even in the same field – Economics, there are large differences in behaviour.

4.2.1.1 Usage (Table 6)

Economics followed a similar pattern to those of the scientific fields, with the top institution (out of a possible 10) accounting for a third of all use. Manchester proved the biggest user (it has a business school), accounting for

around a third of all use according to all the metrics. UCL was the only institution to obtain a 5* ranking in the RAE (2001) but even so ranked only around 4 in usage ranking terms. Cambridge conducted the shortest sessions, 119 seconds, and Bangor the longest ones (403 seconds), indicating that top researchers spend very little time online.

4.2.1.1.1 Use over time (Tables 7 - 9)

There was a greater variation between monthly use than we have previously witnessed elsewhere and this often exceeded 10%. Usage then was quite volatile. The busiest months proved to be February and March. A good deal of use occurred over the weekends and, for Aberdeen, this accounted for 17% of all use. Similarly much use occurred out of normal office hours; in fact, at Bangor the figure exceeded 50%. This usage proved not to be mechanical or robotic, perhaps a security guard, studying economics part-time? Economists proved to be the group that searched most frequently out of hours.

Table 6: Summary of key economics usage metrics

Institution	Total page views		Total full-text views		Total HTML views		Total PDF views		Session numbers		Session time
	N	%	N	%	N	%	N	%	N	%	Ave. in seconds ¹¹
Aberdeen	4966	4	2078	4	820	7	1258	3	1403	4.5	168
Bangor	7325	6	4079	8	600	5	3479	8	1208	3.9	403
Cambridge	23540	19	8922	17	1517	13	7405	18	5958	19.1	119
Edinburgh	15494	12	5865	11	1111	9	4754	11	3478	11.2	169
Manchester	40880	33	18015	34	3917	34	14098	34	10202	32.8	149
Strathclyde	12108	10	6146	12	1301	11	4845	11	2938	9.4	267
Swansea	2976	2	1305	2	422	3	883	2	814	2.6	196
UCL	12844	10	4433	8	1193	10	3240	8	3574	11.5	111
CEH	12	0	2	0	2	0	0	0	7	.0	251
Rothamsted	22	0	13	0	5	0	8	0	9	.0	326

¹¹ Huber's M-Estimator

Table 7: Use over time (percentage of monthly page views)

		Jan	Feb	Mar	Apr
Aberdeen	%	20	28	26	26
Bangor	%	25	28	29	19
Cambridge	%	22	30	28	21
Edinburgh	%	26	29	24	20
Manchester	%	24	25	27	26
Strathclyde	%	24	27	26	25
Swansea	%	20	21	30	29
UCL	%	25	28	27	21
CEH	%	26	26	30	17
Rothamsted	%	28	23	15	34

Table 8: Use over time: (average day of the week percentage page views)

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Aberdeen	%	20	19	16	16	14	7	9
Bangor	%	19	18	18	16	14	7	8
Cambridge	%	19	18	16	17	17	6	8
Edinburgh	%	18	17	17	18	15	7	8
Manchester	%	18	18	16	19	15	6	7
Strathclyde	%	19	18	20	19	13	5	7
Swansea	%	19	19	16	18	16	5	8
UCL	%	18	18	18	18	15	6	8
CEH	%	22	19	23	18	17	1	1
Rothamsted	%	16	18	21	19	20	3	2

Table 9: Use over time (average hourly page views)

		12-5am	6-8am	9-11am	12-2pm	3-5pm	6-8pm	9-11 pm
Aberdeen	N	134	79	904	1395	1472	591	391
	%	2.7	1.6	18.2	28.1	29.6	11.9	7.9
Bangor	N	1524	912	1410	1106	778	639	956
	%	20.8	12.5	19.2	15.1	10.6	8.7	13.1
Cambridge	N	1196	559	4583	5463	5851	3316	2572
	%	5.1	2.4	19.5	23.2	24.9	14.1	10.9
Edinburgh	N	904	412	2609	4168	4111	2002	1288
	%	5.8	2.7	16.8	26.9	26.5	12.9	8.3
Manchester	N	2716	1362	6822	9936	10295	5454	4295
	%	6.6	3.3	16.7	24.3	25.2	13.3	10.5
Strathclyde	N	511	234	2776	3493	2811	1392	891
	%	4.2	1.9	22.9	28.8	23.2	11.5	7.4
Swansea	N	46	99	336	820	1031	437	207
	%	1.5	3.3	11.3	27.6	34.6	14.7	7.0
UCL	N	556	361	2239	3113	3117	2059	1399
	%	4.3	2.8	17.4	24.2	24.3	16.0	10.9
CEH	N	0	0	4	4	4	0	0
	%	0	0	33.3	33.3	33.3	0	0
Rothamsted	N	0	6	10	5	0	1	0
	%	0	27.3	45.5	22.7	0	4.5	0

4.2.1.2 Information seeking behaviour (Tables 10 -11)

Method of access. Unsurprisingly, the levels of gateway (third party) access were considerably down on what we have seen, for instance, in the case of Biomedicine, where it accounted for around 50% of all accesses, reaching over a quarter of sessions only in the case of Aberdeen. Swansea recorded the

greatest use of Google and GoogleScholar – used in 5% of all sessions - and this might be explained by library training programmes.

Navigation. Menu (tables of contents and other lists) use was generally high, and very high at Edinburgh where menus were viewed in three quarters of all sessions. Economists are clearly browsers. Swansea used the advanced search facility the most; Bangor recorded the highest levels of basic searching, around 5% of sessions saw it employed; Manchester recorded the greatest use of the citation facility, around 5% of all sessions saw it utilized; Abstracts proved popular and at Aberdeen, Cambridge, Rothamsted and UCL where they were viewed in more than one in three sessions.

Table 10: Method of access and navigation (sessions)

		Gateway access ¹²	Google access	Google scholar	PubMed access	Athens access	Menu use	Advanced search	Basic search	Citation function
Aberdeen	N	494	22	0	12	7	857	2	39	28
	% ¹³	25.2	2.8	0	1.5	0.9	61.0	0.1	2.8	2.0
Bangor	N	170	8	0	1	38	896	2	63	16
	%	14.0	0.8	0	0.1	3.7	74.0	0.2	5.2	1.3
Cambridge	N	740	156	0	8	373	3675	7	108	105
	%	12.4	3.3	0	0.2	8.0	61.6	0.1	1.8	1.8
Edinburgh	N	474	30	2	10	10	2636	11	108	48
	%	13.6	1.5	0.1	0.5	0.5	75.8	0.3	3.1	1.4
Manchester	N	2198	38	5	6	1361	6480	20	338	472
	%	21.5	0.5	0.1	0.1	18.3	63.4	0.2	3.3	4.6
Strathclyde	N	560	17	0	0	509	2050	6	134	25
	%	19.1	0.8	0	0	25.3	69.8	0.2	4.6	0.9
Swansea		175	31	23	3	17	562	9	37	7
		21.5	5.7	4.2	0.6	3.1	69.0	1.1	4.5	0.9
UCL	N	763	67	0	6	5	2186	3	86	32
	%	21.8	2.7	0	0.2	0.2	61.1	0.1	2.4	0.9
CEH	N	2	0	0	0	0	5	0	1	0
	%	28.6	0	0	0	0	71.4	0	14.3	0

¹² Gateway sites are third party sites, like PubMed Central and Google and does not include library gateways

¹³ percentage of all session for that subject

Rothamsted	<i>N</i>	3	0	0	0	0	6	0	1	0
	%	33.3	0	0	0	0	66.7	0	11.1	0

4.2.1.2.1 Journal content viewed

Bangor recorded the busiest sessions, which averaged 5.1 page views and 2.4 articles. [The CEH data are too low to count]. Edinburgh though viewed the most unique journals in a session (2.4). In regard to the universities, abstract viewing was greatest at Aberdeen where more than a third of sessions viewed an abstract and lowest at Edinburgh and Bangor, where abstracts were viewed in less than a quarter of sessions. Cambridge, Edinburgh, Manchester and Strathclyde all viewed articles aged 1700 days or older. Bangor and Swansea recorded the highest proportions of their sessions viewing an article in print (AIP); around 1 in 10 sessions did so. Generally, the Impact Factors of the journals viewed were on the low side with the relative factor dropping below the key 1.0 mark for Cambridge and Swansea. The high score for Strathclyde stands out (1.4) and is unexplained.

Table 11: Content viewed (sessions)

Subject	Volume			Form	Age/currency			Impact	
	<i>Ave. no. of pages viewed</i>	<i>Ave. no. of articles viewed</i>	<i>Ave. no. of journals viewed</i>		<i>% viewing an abstract</i>	<i>Ave. age of article viewed (days)</i>	<i>Alerts %</i>	<i>% viewing an AIP¹⁴</i>	<i>Ave. impact factor of journal viewed</i>
Aberdeen	3.9	1.6	1.4	35.9	1049	0.1	7.7	1.4	1.0
Bangor	5.1	2.4	1.4	24.3	1471	0	9.8	1.4	1.0
Cambridge	3.6	1.3	1.1	34.0	1756	0.1	4.5	1.3	0.9
Edinburgh	4.4	1.6	1.2	24.9	1736	0.1	5.9	1.4	1.1
Manchester	3.7	1.5	1.1	28.0	1746	0	5.1	1.5	1.0
Strathclyde	4.4	1.8	1.3	32.5	1731	0.1	8.9	2.0	1.4
Swansea	4.2	1.6	1.3	30.1	1431	0.2	9.8	1.2	0.8
UCL	3.3	1.0	1.1	33.4	1266	0	5.1	1.4	1.0
CEH	5.7	1.8	n/a	28.6	729	0	0	1.5	1.1
Rothamsted	5.3	3.6	n/a	44.4	1011	0	22.0 ¹⁵	0.7	0.5

4.2.1.3 Journals used (Tables 12 - 14)

High levels of concentration of use were found at Bangor where two thirds of was accounted for by 5% of journals. There was quite a different picture at Swansea where 5% of journals accounted for just 40% of use. Interestingly, Evans and Peters (2005), using Emerald data for 108 journals showed that 5% of their journals accounted for 17% of use, quite a difference. Excluding the laboratories, where figures were too small to be counted, the highest

articles in press – accepted manuscripts, uncorrected proofs and corrected proofs;

¹⁵ Based on just 4

number of journals viewed was at Manchester (127) and the lowest at Swansea (83). World Development (Table 13) was clearly the most popular journal in the field, ranked first by six of the eleven institutions.

Table 12: Economics journal title use and scatter

	Scatter ¹⁶			Unique journals viewed	As a proportion of subject journals available (132)
	Top 5% of journals viewed account for % use	Top 25% of journals viewed account for % use	Top 50% of journals viewed account for % use		
				N	%
Aberdeen	40	77	93	99	75
Bangor	66	88	96	91	69
Cambridge	47	86	96	117	89
Edinburgh	46	85	97	111	84
Manchester	59	89	97	127	96
Strathclyde	56	86	96	102	77
Swansea	40	79	93	83	63
UCL	46	84	95	113	86
CEH¹⁷	n/a	n/a	n/a	6	5
Rothamsted¹⁸	n/a	n/a	n/a	8	6

¹⁶ Based on unique session views; thus multiple views to the same journal not counted

¹⁷ just 6jnls viewed

¹⁸ just 2jnls viewed

Table 13: Economics top twenty journals

Rank	Aberdeen	Bangor	Cambridge	Edinburgh	Manchester
1	J. of Health Economics	J. of Econometrics	World Development	World Development	World Development
2	Critical Perspectives on Accounting	J. of Environmental Economics & Management	J. of Financial Economics	J. of Financial Economics	J. of Financial Economics
3	Management Accounting Research	J. of Banking & Finance	J. of Econometrics	Research Policy	Research Policy
4	World Development	World Development	J. of Monetary Economics	J. of Development Economics	J. of Banking & Finance
5	J. of Financial Economics	J. of Financial Economics	J. of Development Economics	J. of Banking & Finance	Management Accounting Research
6	J. of Urban Economics	J. of Monetary Economics	European Economic Review	Management Accounting Research	J. of Accounting & Economics
7	J. of Accounting & Economics	Food Policy	J. of Public Economics	J. of Public Economics	Int. J. of Production Economics
8	J. of Econometrics	J. of Economics & Business	Research Policy	J. of Health Economics	J. of Development Economics
9	Regional Science & Urban Economics	J. of Accounting & Economics	Explorations in Economic History	China Economic Review	Critical Perspectives on Accounting
10	J. of Int. Accounting Auditing & Taxation	Economics Letters	J. of Economic Theory	J. of Monetary Economics	European Economic Review
11	European Economic Review	European Economic Review	Economics Letters	Food Policy	J. of Econometrics
12	J. of Economic Behavior & Organization	Emerging Markets Review	J. of Economic Dynamics & Control	J. of Economic Behavior & Organization	J. of Monetary Economics
13	J. of Macroeconomics	J. of Int. Money & Finance	J. of Banking & Finance	J. of Comparative Economics	J. of Int. Economics
14	J. of Int. Money & Finance	J. of Multinational Financial Management	Int. J. of Production Economics	European Economic Review	Economics Letters
15	J. of Banking & Finance	J. of Int. Financial Markets Institutions & Money	J. of Int. Economics	J. of Int. Economics	J. of Int. Money & Finance
16	Int. J. of Production Economics	Economics of Education Review	J. of Environmental Economics & Management	J. of Environmental Economics & Management	J. of Economic Behavior & Organization
17	Research Policy	J. of Economic Behavior & Organization	J. of Economic Behavior & Organization	J. of Econometrics	Structural Change & Economic Dynamics
18	Food Policy	Quarterly Review of Economics & Finance	Int. J. of Industrial Organization	Critical Perspectives on Accounting	J. of Economic Dynamics & Control
19	J. of Policy Modeling	J. of Financial Intermediation	Games & Economic Behavior	Economics Letters	J. of Public Economics
20	J. of Economic Psychology	J. of Econometrics	J. of Health Economics	Explorations in Economic History	J. of Economic Psychology

Rank	Strathclyde	UCL	CEH	Rothamsted	Swansea
1	J. of Financial Economics	World Development	Research Policy	World Development	World Development
2	Critical Perspectives on Accounting	J. of Public Economics	World Development	Economics of Education Review	J. of World Business
3	Management Accounting Research	J. of Econometrics		Economic Modeling	Economics Letters
4	Research Policy	J. of Development Economics		Economics Letters	J. of Banking & Finance
5	J. of Banking & Finance	Handbook of Labor Economics		China Economic Review	J. of Financial Economics
6	World Development	J. of Economic Theory		Food Policy	Food Policy
7	J. of Accounting & Economics	Handbook of Econometrics			J. of Development Economics
8	J. of Corporate Finance	J. of Monetary Economics			J. of Public Economics
9	Int. J. of Production Economics	European Economic Review			J. of Health Economics
10	J. of Econometrics	Games & Economic Behavior			J. of Econometrics
11	J. of Int. Economics	J. of Economic Behavior & Organization			J. of Economic Psychology
12	J. of Monetary Economics	J. of Health Economics			J. of Economic Behavior & Organization
13	European Economic Review	J. of Int. Economics			European Economic Review
14	J. of Int. Money & Finance	J. of Economic Psychology			J. of Int. Economics
15	J. of World Business	Labour Economics			Research Policy
16	J. of Economics & Business	Economics Letters			J. of Monetary Economics
17	J. of Development Economics	Research Policy			Labour Economics
18	J. of Empirical Finance	J. of Urban Economics			Insurance: Mathematics & Economics
19	Review of Financial Economics	J. of Banking & Finance			J. of Economic Dynamics & Control
20	J. of Financial Economics	J. of Comparative Economics			World Development

Table 14: Journals featuring in the top five ranked lists of two or more institutions

Economics titles	Number of Universities
World Development	10
J. of Financial Economics	7
J. of Banking & Finance	5
Research Policy	4
Management Accounting Research	3
J. of Development Economics	3
J. of Health Economics	2
Critical Perspectives on Accounting	2
J. of Econometrics	2
Economics Letters	2

4.2.2 Oxford Journals (OJ)

The RIN study of OJ featured Economics, and also covered Life Sciences and History. Some comparative data for these latter two subjects are provided here also.

4.2.2.1 Usage

Life Sciences proved to be a giant in terms of usage, accounting for over 80% of all the page views to the three case study subjects covered. Admittedly, Life Sciences were pitted against subjects, which had relatively small journal populations. What stood out most in terms of the use metrics was the much higher viewing of articles in HTML format in the Life Sciences, and the high PDF viewing in Economics. Session times were above four minutes.

Table 15: Summary of key subject usage metrics

Subject	Total page views		Total full-text views		Total HTML views		Total PDF views		Sessions		
	N	%	N	%	N	%	N	%	N	%	Ave. in secs
Life Sciences (51% of journals)	509457	80.7	240037	84.3	101094	94.9	138943	78.0	192724	82.6	262
Economics (31% of journals)	66827	10.6	25099	8.8	2567	2.4	22532	12.6	24490	11.5	261
History (18% of journals)	54857	8.7	19598	6.9	2921	2.7	16677	9.4	16154	6.9	262
All case study subjects (61 journals)	631141	100.0	284734	100.	106582	100	178152	100	233368	100	

Tables 16 & 17 provide the key usage statistics for the three JISC case study institutions. Clearly the LSE was the major user of OJ accounting for an astonishing 94% of all use as determined by page views; heavy use, of course has been shown to be a characteristic of the very top research institutions and LSE is frequently rated among the world’s top ten universities. LSE, a specialist university also has the largest body of economists. Cranfield’s performance (last in terms of page views) maybe a function of its small size (it is only postgraduate) but is perhaps surprising as it has a prestigious business school. Viewing articles in PDF is greatest at LSE, with well over half of all views of this kind. Middlesex, an essentially teaching university, boasts the lowest proportion and this could be a function of high student use, we have found elsewhere students like the cutting and pasting freedom of HTML. Not only are LSE the heaviest users they are also the busiest, viewing nearly three pages a session, compared to two for the others.

Table 16: Summary of usage metrics

Institution	Total page views		Total HTML views		Total PDF views		Average page view per session	Average article per session	Sessions conducted
	<i>N</i>	%*	<i>N</i>	%**	<i>N</i>	%**	<i>N</i>	<i>N</i>	<i>N</i>
LSE	28968	94	1090	3.7	10663	36.7	2.7	1.1	10635
Cranfield	874	2.8	1	0.1	157	19.6	2.3	1.1	388
Middlesex	983	3.2	32	3.4	128	13.8	2.1	1	461

*Percentage is based on the total for the three universities.

** Percentage is based on the total number of page views for each individual university

4.2.2.1.1 Use over time (Tables 17-20)

In the cases of Economics and History, November proved to be the month in which most use took place (accounting for nearly 15% of annual use). For these two subjects, respectively, September and August were the quietest months when less than 5% of use occurred.

Table 17: Use over time (monthly percentage of page views)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Life Sciences	%	8.9	8.9	10.0	7.8	8.9	7.0	7.2	7.3	6.8	10.6	10.4	6.3
Economics	%	8.8	10.7	9.9	8.7	10.2	4.7	4.3	5.2	4.2	11.4	14.7	7.2
History	%	9.5	9.9	9.7	7.1	8.8	5.9	4.2	3.4	4.7	13.9	14.9	7.9
All case study subjects	%	9.0	9.2	9.9	7.8	9.0	6.7	6.6	6.7	6.3	10.9	11.2	6.6

Table 18: Use over time: (average day of the week page views)

		2007	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Life Sciences	N	509,457	96,422	99,558	96,044	94,379	80,269	20,561	22,224
	%	100	18.9	19.5	18.9	18.5	15.8	4.0	4.4
Economics	N	66,827	11,776	11,909	11,066	10,754	9,620	5,861	5,841
	%	100	17.6	17.8	16.6	16.1	14.4	8.8	8.7
History	N	54,857	9,964	10,323	9,238	10,052	7,951	3,536	3,793
	%	100	18.2	18.8	16.8	18.3	14.5	6.4	6.9
All case study subjects	N	631,141	118,162	121,790	116,348	115,185	97,840	29,958	31,858
	%	100	18.7	19.3	18.4	18.3	15.5	4.7	5.0

Table 19: Use over time (average hourly page views)

		12-6am	6-8am	9-11am	12-2pm	3-5pm	6-8pm	9-11 pm
Life Sciences	N	12706	9471	112670	150338	152975	50254	21043
	%	2.5	1.9	22.1	29.5	30.0	9.9	4.1
Economics	N	4379	1301	10195	17417	18365	9394	5776
	%	6.6	1.9	15.3	26.1	27.5	14.1	8.6
History	N	1760	820	9949	17185	15968	5719	3456
	%	3.2	1.5	18.1	31.3	29.1	10.4	6.3
All case study subjects	N	18845	11592	132814	184940	187308	65367	30275
	%	4.5	2.8	31.8	44.3	44.8	15.6	7.2

For the three case study institutions the patterns of use throughout the day were quite similar, peaking in the afternoons. However, late night/early morning use at LSE was considerably higher than at the other two institutions: 6.2% of usage occurred between midnight and 6am, compared to less than half that for the two other institutions.

Table 20: Use over time, Economics

	LSE		Cranfield		Middlesex	
	N	%	N	%	N	%
12-6am	1814	6.2%	22	2.7%	32	3.4%
6-8am	319	1.1%	12	1.5%	10	1.1%
9-11am	4146	14.3%	130	16.2%	129	13.9%
12-2pm	7466	25.7%	225	28.1%	279	30.1%
3-5pm	8332	28.7%	227	28.3%	257	27.7%
6-8pm	4461	15.3%	112	14.0%	188	20.3%
9-11 pm	2535	8.7%	74	9.2%	33	3.6%

4.2.2.2 Information seeking behaviour (Tables 21 - 22)

Oxford Journals has been open to Google for some years now, and it showed. Thirty-seven percent of Economics sessions arose from a Google search, and such searching proved particularly popular with Historians, 45% of their sessions arose from a Google search. Google Scholar proved very popular with Economists, where 22% of sessions originated from Scholar. Google and GoogleScholar featured very highly in the information seeking behaviour of the JISC three case study institutions too. In the case of all of them Google was the main route by which they accessed the Economics journals on the OJ site and GoogleScholar the second most popular route. In the case of LSE more than 5000 visits arrived via these two services. The equivalent figure for Middlesex was 284 and Cranfield 239.

Advanced searching proved a little more popular than was the case with ScienceDirect, with, for instance, 1% of Economics sessions seeing it employed. Basic (internal) searching proved a little more popular – 5% of sessions saw it used in the case of Economics but nowhere near as popular as web engine searching. As with ScienceDirect, menus provided the most popular way of finding content once the user was in the database, although they did not prove quite so popular, and platform differences might well

account for this. Thirty-three percent of Economists' sessions saw them used; however, they proved most popular in the case of Historians, 43% of sessions featured a view of a menu. Advanced searching was almost wholly absent from the sessions conducted at Cranfield and Middlesex, present in only 7 and 10 sessions respectively. Given the higher levels of use at LSE it is not surprising that the equivalent figure is 366 and this means that 3.4 sessions saw the facility used, which in fact constitutes relatively high levels of use.

Table 21: Method of access and navigation (sessions)

Subject		Access		Search		Browse
		Google access	Google scholar	Advanced search	Basic search	Menus
Life Sciences	N	74230	3291	3904	13118	79392
	% ¹⁹	39%	2%	1%	3%	16%
Economics	N	8980	5332	757	3115	22341
	%	37%	22%	1%	5%	33%
History	N	7325	1313	1170	5293	23755
	%	45%	8%	2%	10%	43%
All case study subjects	N	90535	9936	5831	21526	125488
	%	39%	4%	1%	3%	20%

Despite the fact that a good proportion of History journals had abstracts, very few Historians viewed an abstract in a session. In fact three times as many Life Science and Economics sessions saw an abstract viewed. The average number of pages viewed in a session was within the parameters of what we

¹⁹ percentage of all session for that subject

have seen in ScienceDirect, there was just less variation in the case of Oxford Journals. Page number counts were quite similar for Life Sciences but a little less for Economics. The average number of articles viewed was the same for all fields and in line with what was found for ScienceDirect.

Table 22: Content viewed (sessions)

Subject	Volume	Form	Content
	<i>Ave. no. of pages viewed</i>	<i>Ave. no. of articles viewed</i>	<i>viewing an abstract %</i>
Life Sciences	2.7	1.1	16.0
Economics	2.7	1.1	18.3
History	2.8	1.1	5.2

In regard to the case study institutions abstract viewing (based on the percentage of page views to an abstract) was greatest at Cranfield (40% of views) and lowest at LSE (less than a quarter of pages, 23%, viewed were abstracts). The figure for Middlesex was 34%.

As we discovered with the ScienceDirect study Economists show a strong preference for the current literature. Thus in the case of OJ 25% of views were to articles 10 months old and the median age of articles viewed was just 27 months, or a little over two years. An interesting feature of the obsolescence analysis is that the age of journal articles declines in the summer months.

4.2.2.3 Journals used

Table 23 lists the most used journals for Economics.

Table 23: Top Economics journals

Rank	Economics
1	Oxford Review of Economic Policy
2	Cambridge J. of Economics
3	Review of Finance
4	Industrial and Corporate Change
5	Oxford Economic Papers
6	World Bank Economic Review
7	World Bank Research Observer
8	J. of Economic Geography
9	J. of Financial Econometrics
10	European Review of Agricultural Economics
11	Contributions to Political Economy
12	J. of Financial Econometrics
13	Socio-Economic Review
14	J. of Competition Law and Economics
15	CESifo Economic Studies
16	American Law and Economics Review
17	Review of Finance
18	Review of Environmental Economics and Policy

4.2.3 Main points arising from the project

- Like their colleagues in other fields Economists use e-journal databases with alacrity but in a direct, quick and pragmatic way, usually spending less than four minutes on any one visit and view only a small number of pages (typically about 2-4) and articles (1-2).
- There was considerable difference between the usage and information seeking behavior of Economists at the various institutions, with those at research intensive institutions using the databases more - although spending less time on a visit, and using less of the functions on offer.
- A good deal of use took place outside office hours, in the evening and on weekends, more so than for other subject fields.
- There was a greater variation between monthly use than we have previously seen with other subjects and this often exceeded 10%. Usage then was quite volatile.

- Economists evidence a very strong preference for PDF displays.
- Economists proved to be among the biggest users of abstracts.
- Google and GoogleScholar searching proved very popular with Economists, with, respectively, 37% and 22% of visits arriving by those means. Browsing menus and lists provided the most popular way of finding content once the user arrived at the e-journal database.

4.3 Use and information seeking behavior of international Economists in respect to e-journals. Elsevier funded Authors as users research project²⁰.

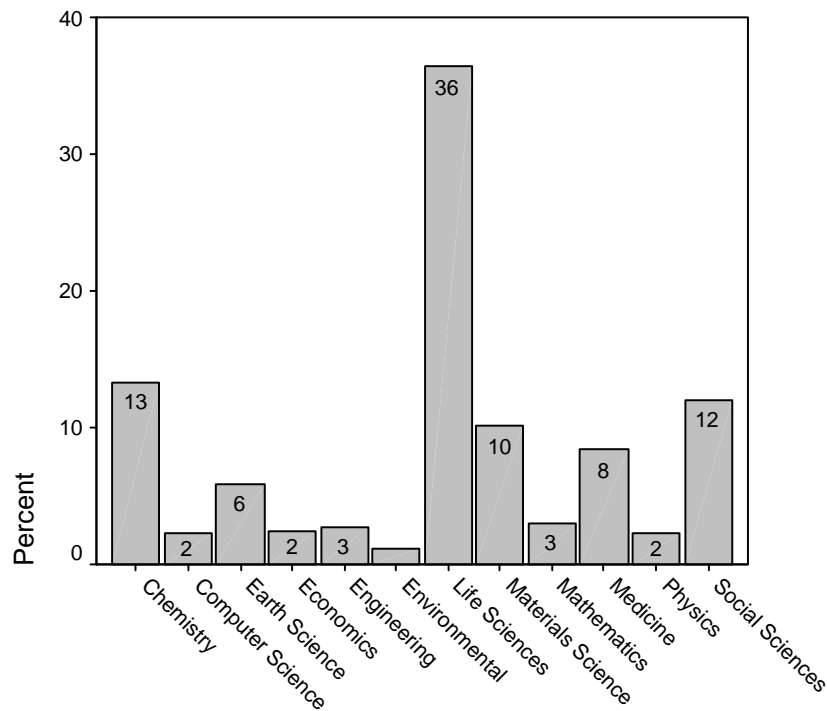
The main aim of the research project was to provide a comprehensive (360 degree) understanding of the scholarly journal user (authors in this case) by linking together data obtained about their attitudes towards scholarly publishing issues and activities (e.g. open access, peer reviewing), obtained through a questionnaire, with data about their use of ScienceDirect, obtained through deep log analysis. This has never been undertaken before so the analysis provides unique and rich insights into scholarly journal use and seeking. Logs were collected for an eighteen month period (11/2003 - 5/2005) and in all these authors conducted 16,865 sessions, which saw 110,029 pages viewed.

4.3.1 Characteristic of population studied

More than 750 authors were studied and Figure 4 shows their subject distribution. Economics accounted for approximately 2% (30 people) of the sample.

²⁰ <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/>

Figure 4: Frequency distribution of views by main subject category of journal.



The Economists in the sample tended to be younger. Thus the majority (56%) of Economists were between 36 and 45 years old, more than half as much again compared to other subject groupings (32%). The proportion of male Economists was greater than the number of males in the other subjects - 92% compared to 75%. Considerably more Economists came from North America (43% compared to 15%) and less from Asia (6% to 24%).

4.3.2 Results

Table 24 provides a summary of the results of the project²¹, with subject comparisons between Economics and a representative group of other subjects. Some subject comparisons are based on the subject of the journal used and

²¹ <http://www.ucl.ac.uk/infostudies/research/ciber/>

others based on the user's own perception of what subject they belonged to and this is indicated in the Table.

Table 24: Usage and information seeking characteristics of author users of ScienceDirect: subject comparisons (percentages)

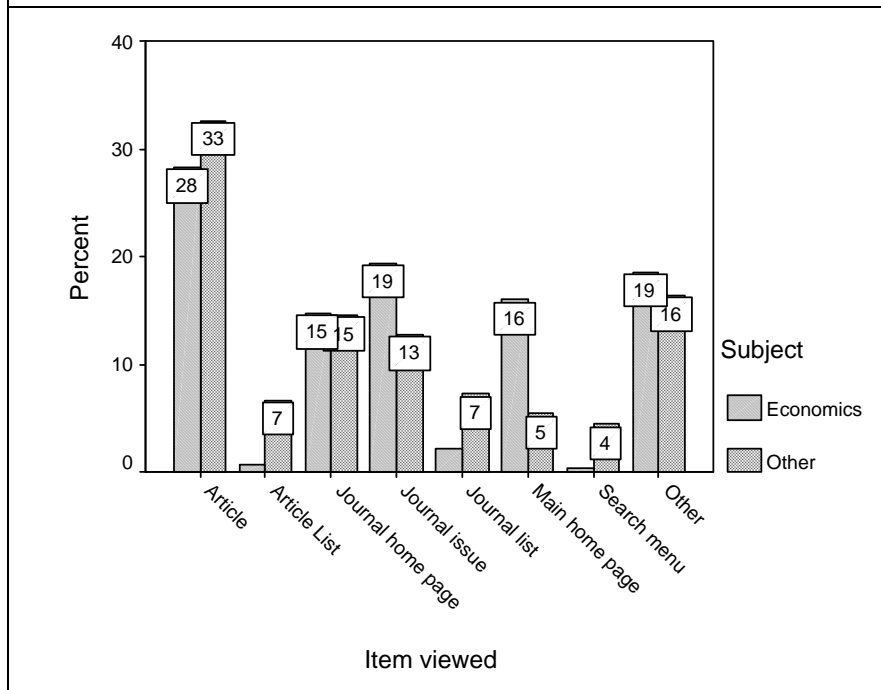
		Economics and Econometrics	Biological Sciences	Chemistry	Physics	Earth Sciences & Environment sciences
Type of journal item viewed (user subject)	Article	28	40	27	31	33
	Journal homepage	15	13	17	18	16
	Search menu	0.8	3	0.8	2	2
	Article list	1	4	6	5	4
	Journal list	3	5	14	6	3
	Main homepage	16	7	7	4	5
	Journal issue	19	12	13	17	16
Type of journal content viewed (user subject)	Abstract	33	13	12	26	16
	Full-text	17	15	9	7	17
	PDF	18	24	59	43	35
	Full-text & PDF	13	34	11	11	16
	Abs+fulltext+PDF	19	14	9	14	15
Type of article viewed (journal subject)	Article in print (pre- print)	28	11	16	18	16
	Regular	72	89	84	82	84
Type of article viewed (user subject)	Article in print (pre- print)	7	9	14	13	16
	Regular	93	91	86	87	84
Age of article viewed (journal subject)	Current (2004-5)	74	57	57	69	59
	Declining (1999- 2003)	23	37	35	26	33
	Old (1993-2002)	3	6	7	5	8
Age of article viewed (user subject)	Current (2004-5)	71	58	59	52	61
	Declining (1999- 2003)	25	36	32	37	30
	Old (1993-2002)	4	5	9	11	9
No of requests (views) in a session (user subject)	1	13	21	13	12	10
	2-3	36	37	23	25	27
	4-10	35	33	45	47	47
	11-20	9	7	13	10	10
	Over 20	7	3	6	5	6
No of unique journals viewed in a session (user subject)	None	7	15	9	12	8
	1	65	62	61	55	64
	2-4	25	20	26	29	25
	5-10	3	2.5	3	3.5	2.5
	Over 10	0	0.5	1	0.5	1.5

No of searches in a session (user subject)	One	71	57	58	67	64
	2-4	29	33	31	26	31
	5-10	0	9	10	6.5	5
	Over 10	0	1	1	0.5	0
Search method by user subject	Journal	36	48	25	63	36
	All products	43	30	31	25	48
	All journals	7	2	36	8	8
	other	14	20	7	4	8
Searches by no of returned hits (user subject)	Search dropped	7	23	2	7	2
	Zero	56	22	25	21	45
	1-2	11	10	10	10	8
	3-10	2	10	18	14	17
	10-50	15	13	18	26	15
	51 & over	7	21	27	23	13
Average no. of article viewed (user subject)		1.1	1.7	1.8	1.6	1.9

4.3.2.1 Type of journal item viewed

Page views to articles accounted for 28% of views, much the same as for the average for other subjects (Figure 5). Visits to the journal issue page (19% to 13%) and main home page (16% to 5%) were higher for Economists as compared to the other subjects, but lower for views to the journal lists (2% to 5%).

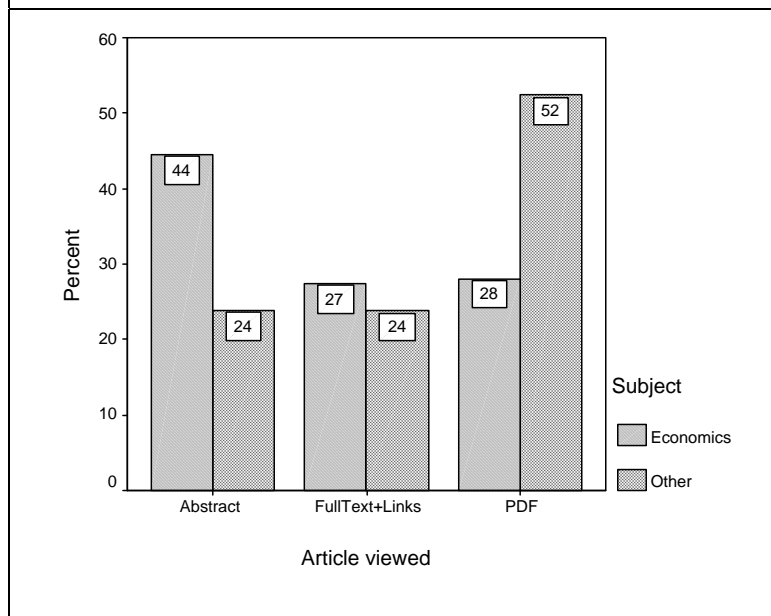
Figure 5: Percentage distribution of type of journal item viewed by subject.



4.3.2.2 Type of journal content viewed

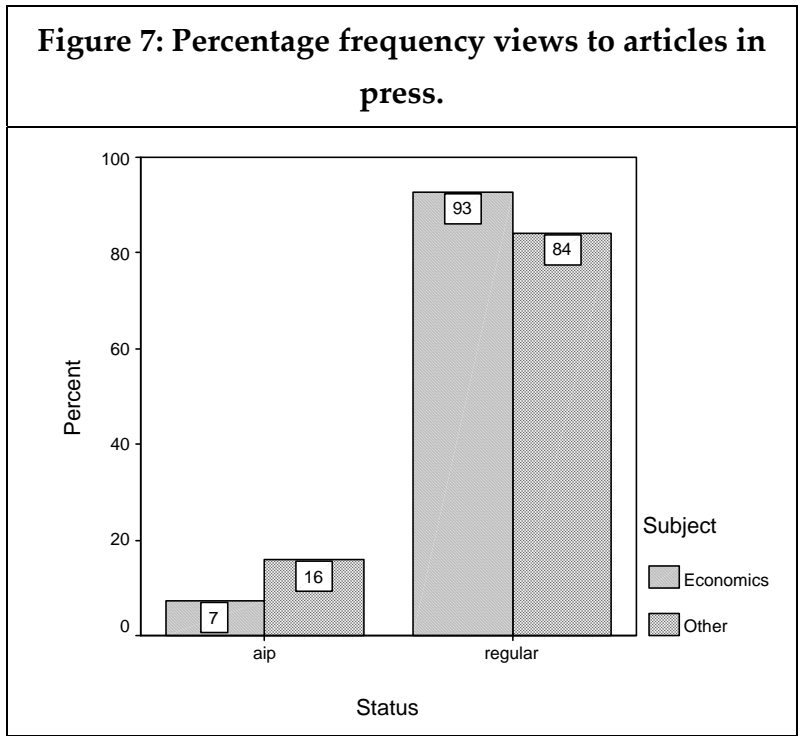
In terms of the journal content page views by subject most (44%) views by Economists were to abstracts, considerably more than for the other subjects (24%). Economists were considerably less likely to view PDFs (52% to 28%).

Figure 6: Percentage distribution of type of journal content viewed by subject grouping.



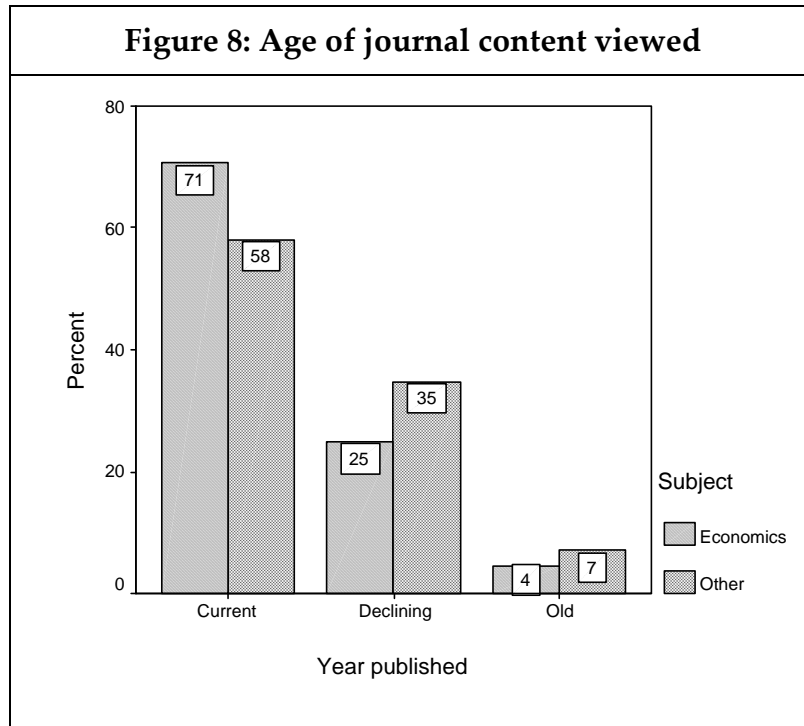
4.3.2.3 Type of article viewed (currency indicator)

The ScienceDirect logs provided an opportunity to investigate a rather unusual deep log metric – the status of an article (articles in press or regular). Articles in press (AIP), refers to articles which have not been finalised but are available online (pre-prints). Regular describes finally published papers. The analysis probably tells us something about the need for currency on the part of the user. Economics recorded a lower rate of views to ‘articles in press’ as compared to the average for other subjects (7% and 16% respectively).



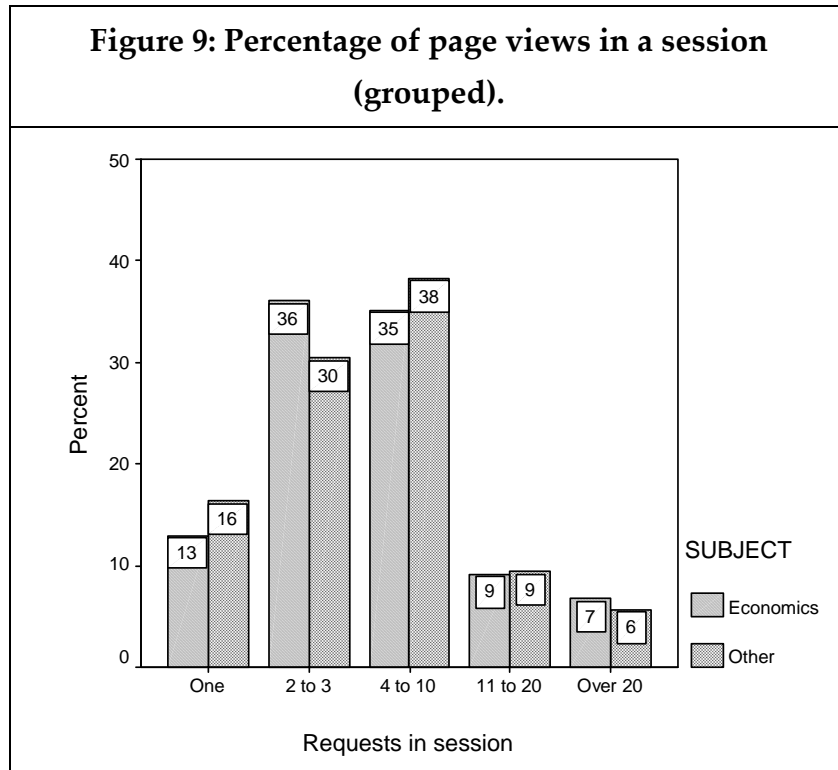
4.3.2.4 Age of article viewed

Economists, as defined by the user's perception of their subject, were much more likely to view current material (up to two years old), 71% as compared to 58% for other subjects. The figure rises to 74% if we conduct the analysis on the subject of journal. Economists were generally less likely, than those from other subject groupings, to view older (more than 5 years old) content (4% compared to 7%), and much less likely (25% to 36%) to view declining content (2 to 5 years old) (Figure 8).



4.3.2.5 Number of page views in a session or visit

This is a 'busyness' metric and possibly demonstrates the degree of interest or user satisfaction. Economist tended to make slightly less views in a session compared to other subjects. More than one third of Economists (36%) viewed 2 to 3 pages, as compared to 30% for other subject groups.



4.3.2.6 Other analyses (highlights of Table 24)

- Most visits (two-thirds) only involved the viewing of one journal
- Most visits (well over two-thirds) saw only one search made and one article viewed
- The all product search (every thing available on ScienceDirect)
- Well over half of all searches resulted in no hits at all, suggesting a problem with search terms or finding what they want

4.3.2.7 Attitudinal data

As mentioned it proved possible to link usage with questionnaire data supplied by ScienceDirect users. Two things stood out:

- Economists were more likely to agree with the statement, the question “the quality of an article is determined by the journal” compared to other subjects. Economics scored 3.43, the second highest score. Environmental Science (3.63) and material Science 3.27 scored highly

by this question, while Mathematics (2.57), Social Science (2.73) and Engineering (2.85) recorded low scores.

- Economists were more likely to agree with the statement “it is more important to publish in a prestigious general journal, than a MORE appropriate specialised journal” their score was 3.6. Those accessing Computer Science (2.6), Physics (2.7) and Medicine (2.8) journals tended to disagree with the statement.

4.3.3 Main points arising from the project

Economists recorded the:

- lowest percentage of page views to article lists and journal lists (they appeared not to be general browsers, however they recorded the highest number of views to journal issue pages (a case of focused browsing?));
- highest percentage of views to abstracts;
- highest percentage of views to articles in print (based on journal subject), but also the lowest percentage of views to articles in print viewed (based on user subject), something which suggests the two user populations are differently;
- highest percentage of views (70-75%) to current articles (up to 2 years old) and lowest views to old articles (aged over 5 years old);
- highest proportion of sessions viewing over 20 pages;
- highest proportion of sessions seeing just one search conducted and the lowest number of sessions with 5 and over searches;
- highest proportion of searches with zero hits returned, suggesting a problem with search terms or finding what they want, and the lowest number of searches with 3-10 returned hits;
- lowest average number of articles viewed in a session.

In addition:

- most visits (two-thirds) only involved the viewing of one journal
- most visits (well over two-thirds) saw only one search made
- the all product search (every thing available on ScienceDirect) was particularly popular

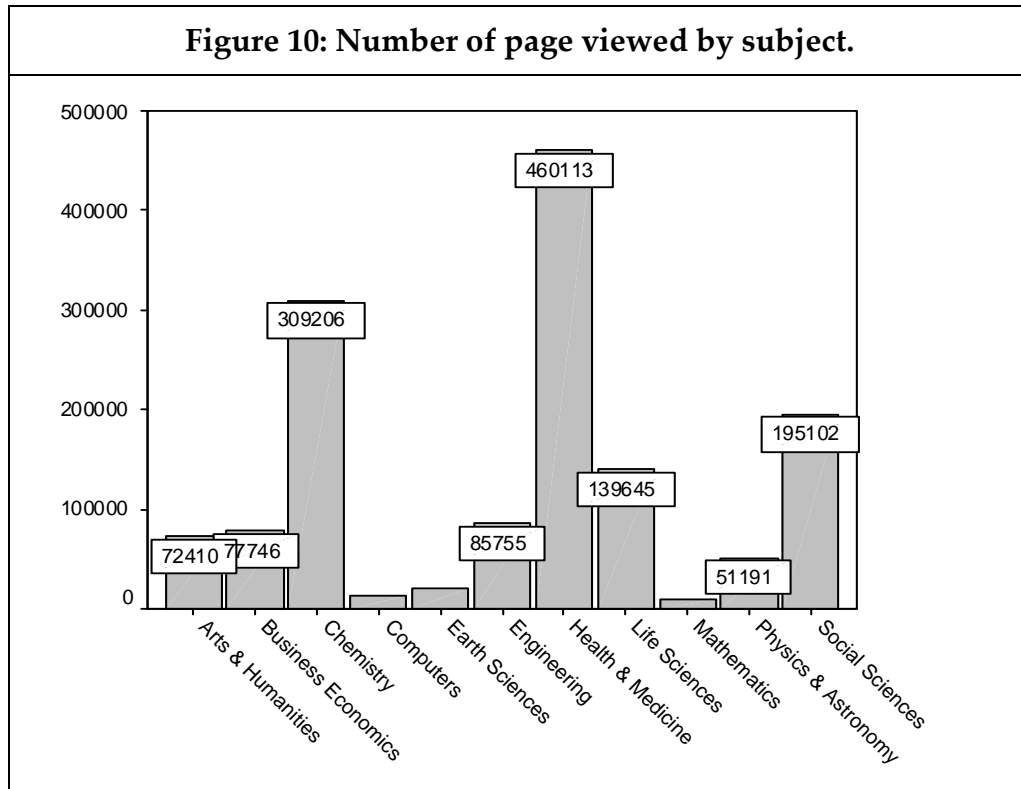
4.4 Use and information seeking behaviour of US students and faculty in respect to business e-journals. IMLS funded MaxData research project^{22 23}

The MaxData study, conducted with the University of Tennessee, sought to develop and test methods, which would help university librarians, evaluate their journal usage. The study, conducted during the period 2005-2008, focused largely on five American universities, a mixture of research and teaching, and large and big ones. The fact that the study confined itself to US academics, staff and students, means that the findings need to be treated with care. This is because we have found quite big differences in information seeking behaviour between scholars according to their nationality, even in the same discipline (Nicholas et al 2008). The study consisted of a deep log analysis of journal usage over a period of 15 months on the OhioLINK platform by four Ohio Universities. Altogether 2,250,000 pages were viewed and 339,000 sessions conducted, demonstrating how genuinely popular e-journals are with the scholarly community.

OhioLINK covers all subject fields, including Business and Economics. As can be seen from Figure 10 in usage terms Business is a medium size field.

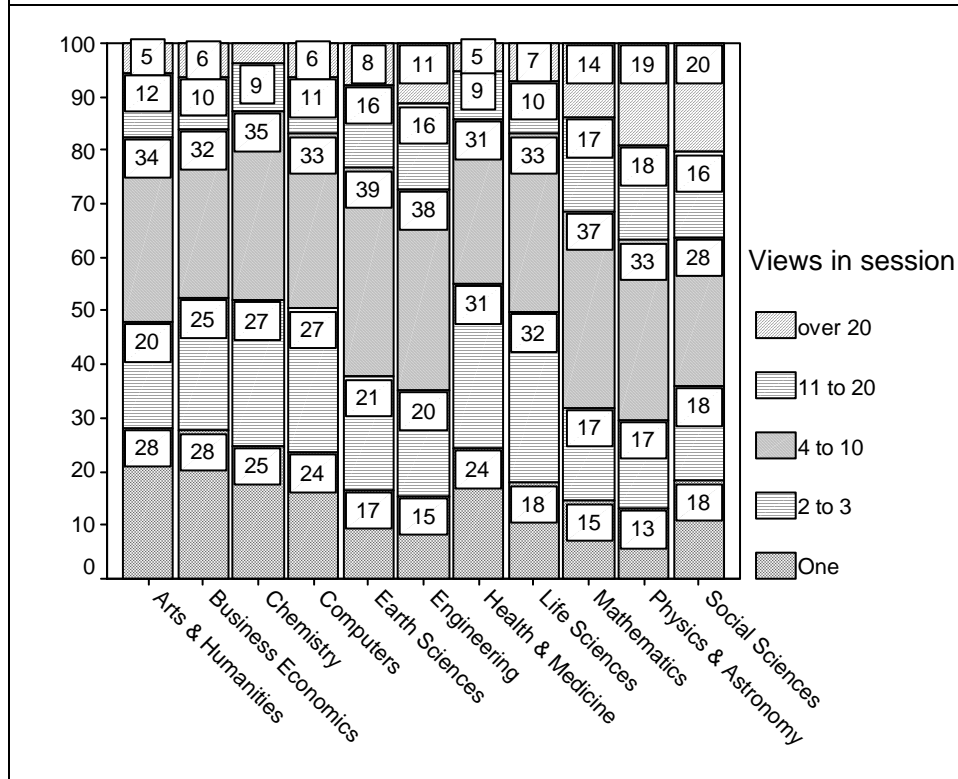
²² <http://www.ucl.ac.uk/infostudies/research/ciber/downloads/>

²³ <http://web.utk.edu/~tenopir/maxdata/index.htm>



Business boasted the highest proportion of bouncers, those users viewing just one page (28% did so). Also over half of all sessions saw no more than three pages viewed. Contrast that to the bouncer rate (13%) for Physics.

Figure 11: Percentage distribution of page views in a session by subject



Session times for Economics were around the average with about half of all sessions being completed within 3 minutes. Those people viewing Social Science journals recorded the longest session times, with 31% lasting over fifteen minutes (Figure 12). Physics journals were also viewed for relatively long times, 30% lasting over 15 minutes. Regarding page view time (Figure 13) Economics was again around the average with a page view time of 22 seconds. Physics and Astronomy recorded the highest average (median) time of 25 seconds while Computer Science recorded the lowest at 19 seconds.

Figure 12: Percentage distribution of session time by subject

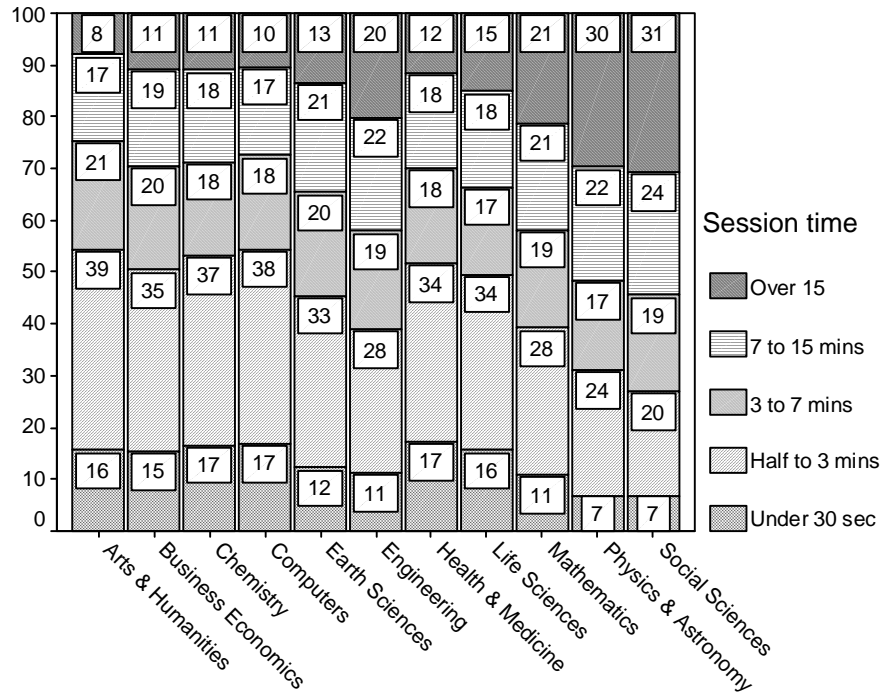
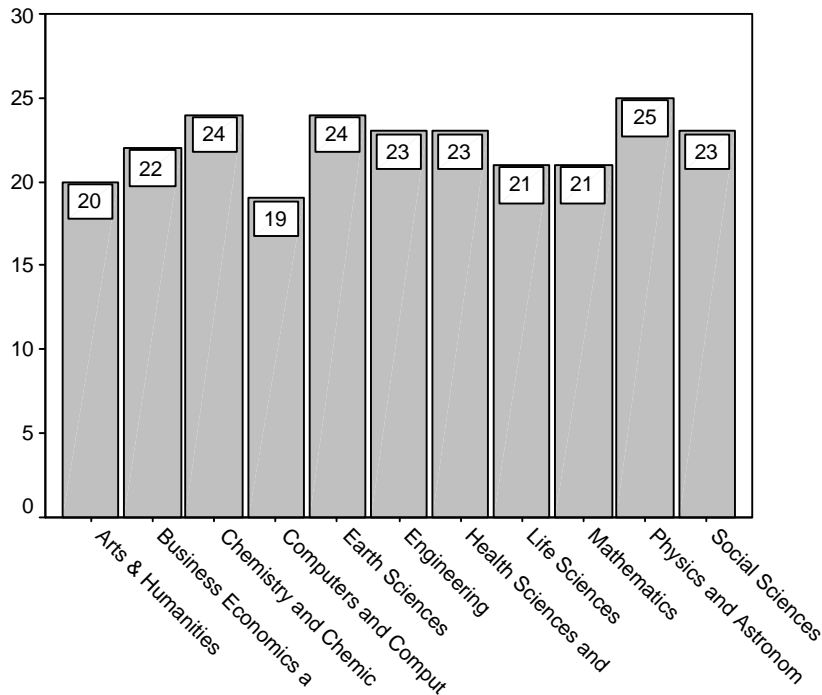
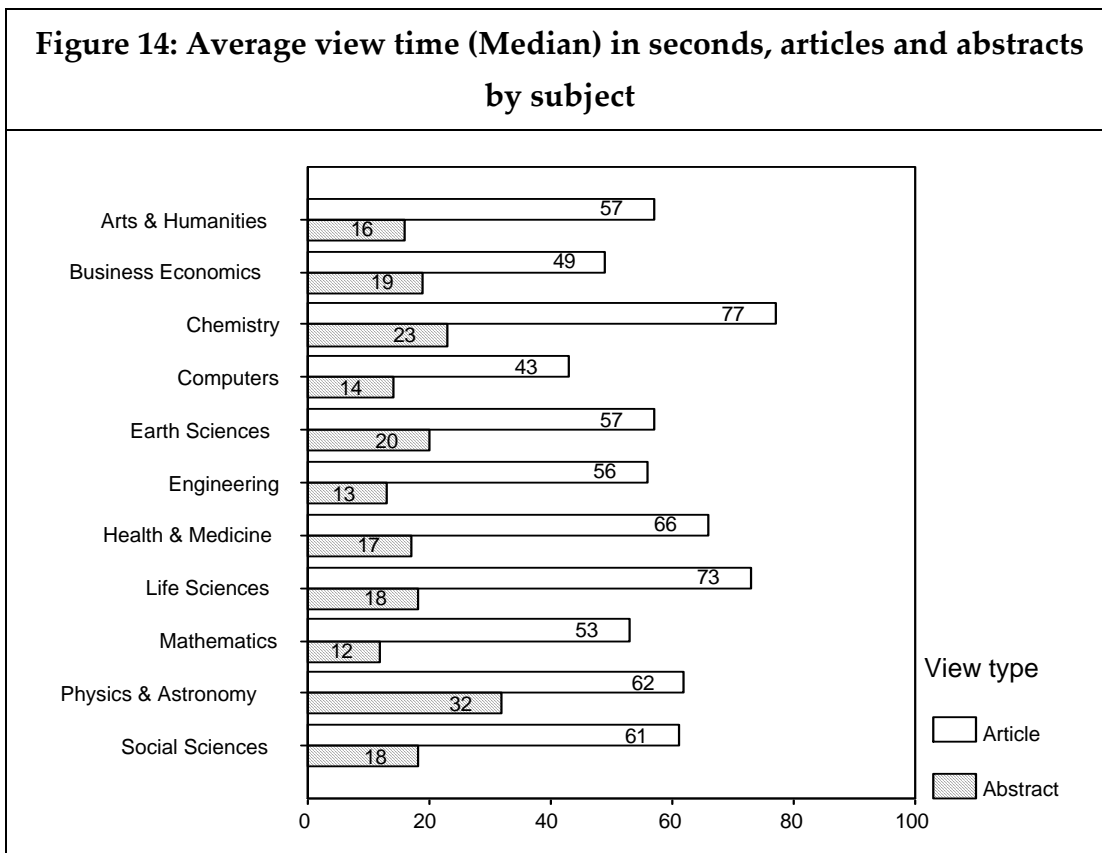


Figure 13: Average (median) page time by subject

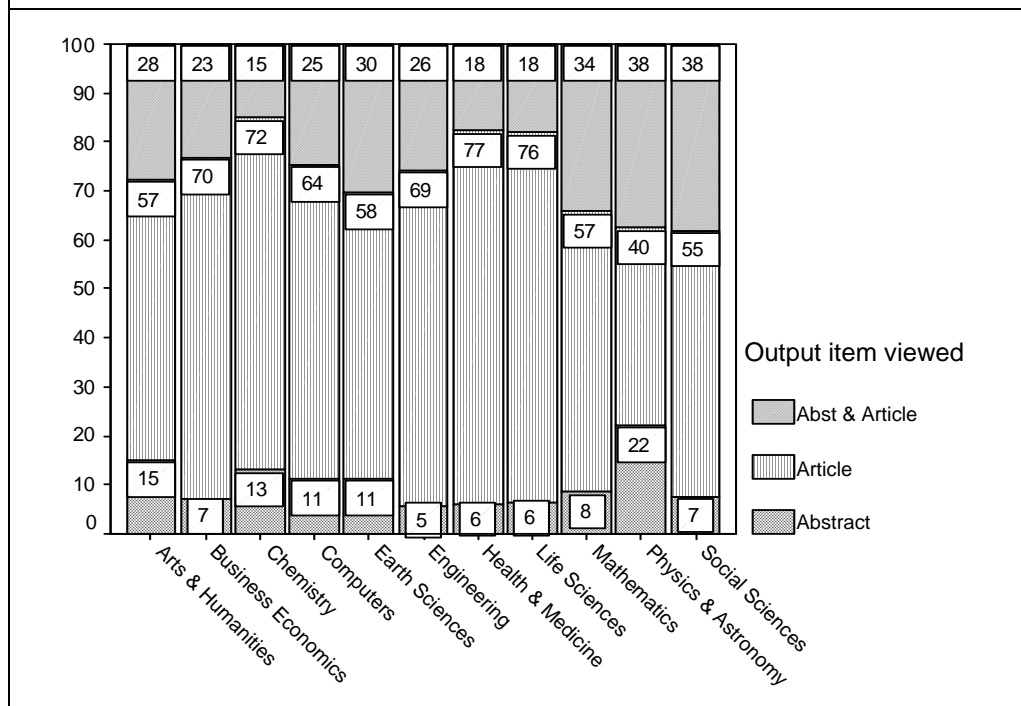


In terms of just article and abstract viewing (Figure 14), Chemistry and Life Sciences recorded the longest article view times, respectively, 77 and 73 seconds; Computer Science (43 seconds) and Business and Economics (49 seconds) recorded the shortest article view time. Abstract reading time also varied across subjects, a surprising amount, with Mathematics (12 seconds) recording the shortest and Physics and Astronomy (32 seconds) the longest time, and Business in the middle with 19 seconds.



With regard to type of journal content viewed (abstract, article or both) in a session, those viewing Physics and Astronomy titles were proportionately more likely just to view just abstracts (22%) and this compares with a figure of just 7% for Business.

Figure 15: Percentage distribution of article items item across subject



In terms of the navigational paths that could be identified most people, including Economists, browsed the alphabetic and subject lists, although search was the preference for the Life Sciences (Table 25). Those people viewing Earth Science, Engineering, Mathematics, Physics and Social Science titles made the greater use of the search facility and those viewing Chemistry and engineering titles were more likely to use alphabetical/subject lists.

Table 25: Method of navigation

		Business Economics	Chemistry	Earth Sciences	Life Sciences	Physics and Astronomy
Navigational access	Search	17	10	28	13	26
	Alpha & Subject lists & Search	9	5	16	6	11
	Alpha or Subject lists	30	40	26	54	29
	Unknown/other	34	28	18	20	18

In the case of one research intensive university it proved possible to distinguish between staff and student use through sub network identification. The analysis confirmed the long held view that students were the majority users of digital resources, probably because there are simply much more of them. Student use was ten times that of staff, however, it was much lighter. Take the number of views in a session, staff made a greater number views in a session compared to the students: 27% of their sessions saw eleven or more pages viewed in a session; however, just 12% of student sessions viewed that many pages. Other difference between staff and students were: a) staff accounted for a much high proportion of Social Science use; b) staff made up a lower percentage of weekend use; c) staff were more likely to use the search facility; d) staff were less likely to conduct sessions where just current/recent journals were viewed.

4.4.1 Main points arising from the project

- Business boasted the highest proportion of ‘bouncers’, those users viewing just one page (28% did so). Also over half of all sessions saw no more than three pages viewed.

- Session times for Economics were around the average with about half of all sessions being completed within 3 minutes. Page view time was again around the average with a page view time of 22 seconds
- In terms of the navigational paths that could be identified most people, including Economists, browsed the alphabetic and subject lists.
- Students were the majority users of OhioLINK, probably because there are simply many more of them. Student use was ten times that of staff, however, it was much lighter, they tended to view fewer pages

5.0 Conclusions

Business/Economics staff and students have traditionally been big and important users of the published literature and therefore it is no surprise to discover that they are big, strategic and pioneering users of today's digital scholarly literature. It is therefore puzzling that business/economic scholarly users have been the subject of such little research here in the UK.

Essentially they use and seeking information very much like their virtual colleagues. That is they make characteristically short visits, which see only a few pages and documents viewed; they like using Google and GoogleScholar and are browsers when they get to a website; they find abstracts very useful (probably for browsing purposes) and like searching off-site and outside the traditional (9-5) working day.

They are also distinctive in their use and information seeking and their key characteristics are summed up below.

5.1 E-book users

Volume and pattern of use

- Business studies students are heavy users of e-textbooks and e-books generally. Those students at the newer universities are especially heavy users. Use also appears to be growing at a healthy rate. Popularity could be put down to a number of factors: a) the books were more attractive to university users; b) the nature of business studies means that e-books are especially attractive; c) staff and librarians promote them more.
- E-textbook searching is less tied to the rhythms of the teaching year than other subjects and this could be because students have more

project work or because of the large postgraduate numbers in the field.

Location of use

- Business e-book users tend to search off campus (the fact that many are part-time and this provides part of the explanation)

Search and navigation

- Business users liked using search facilities to navigate towards e-book content. The library catalogue/OPAC was the main means of accessing e-textbooks.
- The e-book user was easily distracted and confused by the myriad navigational routes and display options, and the ability to move out of the e-book environment with ease and at will.
- As ever, advanced searching was hardly ever used though.

Nature of use and content viewed

- E-textbooks were mainly used for obtaining snippets of information and fact finding. Power browsing of multiple e-text books was characteristic, a function of massive choice. There appeared to be very little extended reading of e-books
- The most important reason for using e-books was convenience - of transporting and accessing them.
- Interactive features of e-textbooks were highly appreciated.

5.2 E-journal users

Users

- Students were the majority users, probably because there were simply many more of them. Student use was ten times that of staff in the case

of the OhioLINK study, however, there use was much lighter as they viewed fewer pages in a session.

Volume and pattern of use

- Economists used e-journal databases with alacrity but in a direct, quick and pragmatic way, usually spending less than four minutes on any one visit and view only a small number of pages (typically about 2-4) and articles (1-2). Business boasted the highest proportion of ‘bouncers’, those users viewing just one page (28% did so). Also over half of all sessions saw no more than three pages viewed. Session times for Economics were around the average with about half of all sessions being completed within 3 minutes. Page view time was again around the average with a page view time of 22 seconds.
- There is however a group of persistent users because Economists also recorded the highest proportion of sessions viewing over 20 pages.
- There are differences between the usage and information seeking behavior of Economists at the various institutions studied, with those at research intensive institutions using the databases more - although spending less time on a visit, and using less of the functions on offer.
- A good deal of use took place outside office hours, in the evening and on weekends, more so than for other subject fields.

Searching and navigation

- Google and GoogleScholar searching proved very popular with Economists, with, respectively, 37% and 22% of visits arriving by those means.
- Browsing menus, contents pages and lists provided the most popular way of finding content once the user arrived at the e-journal database.
- Recorded the highest proportion of sessions seeing just one search conducted and the lowest number of sessions with 5 and over searches.

- Recorded the highest proportion of searches which returned zero hits, suggesting there might be a problem with search terms or finding what they want, and the lowest number of searches with 3-10 returned hits.
- Most visits (well over two-thirds) saw only one search made.
- In terms of the navigational paths that could be identified most people, including Economists, browsed the alphabetic and subject lists.

Nature of use and content viewed

- Economists show a very strong preference for PDF displays.
- Economists proved to be among the biggest users of abstracts.
- Recorded the lowest average number of articles viewed in a session.
- Recorded the most visits (two-thirds) only involved the viewing of one journal.
- The all-product search (every thing available on ScienceDirect) proved particularly popular, again a manifestation of a browsing trait.

Currency/age

- Recorded the highest percentage of views to articles in print (based on journal subject).
- Recorded the highest percentage of views (70-75%) to current articles (up to 2 years old) and lowest views to old articles (aged over 5 years old);

Finally the case study institutions – all with business schools or, in the case of LSE, a major economics specialism, differed markedly, with:

1. LSE: a) best in terms of all MyiLibrary e-book use; b) biggest Oxford Journals e-journal user, by miles; c) undertook the most searching of e-journals in the early hours;
2. Cranfield: a) best performing in terms of JISC e-textbook use; b) biggest user of abstracts;

3. Middlesex: a) appears to hardly use e-books at all, or if they do it must be some other platform

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