Cranfield

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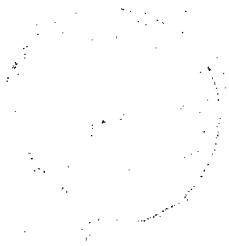

CRANFIELD INSTITUTE OF TECHNOLOGY

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Contents

Summary

A survey of user opinions towards and experience of Cranfield's LIBERTAS library automation system was conducted in order to determine user attitudes towards the system, user characteristics which predict these attitudes and the key areas for improvement in service provision. The survey (n = 137) included student and staff users of the academic library and included in-library and remote access of LIBERTAS.

Two key attitudes concerned the main uses to which LIBERTAS can be put and the learning effort required for its use. The study identified that in general user perceptions of the utility and usability of the system are positive but indicate the need for improvements in system design and user education. It was found possible to predict more positive user attitudes on the basis of regularity and frequency of general system use and, in particular, use of the inter-library loan facility and certain catalogue searching facilities. However, other user characteristics such as demographic details and previous education and experience were not found to be associated with user attitudes toward the system.

Six service change areas were identified from user opinion on recommended improvements and were concerned with additional functionality, system prompts, paper-based information support, training, Boolean searching and networking. Recommendations for service improvements in each of these areas are provided and include networking LIBERTAS with CD-ROM bibliographic retrieval systems.

A discussion of the need for further empirical research in this area includes a requirement for focusing on the relationship between increased use of LIBERTAS and an increase in positive user perceptions and for user-centred evaluations of future system developments.

1. Introduction

With the growth in the availability, expected use and power of information technology (IT) in work organisations, the criticality of appropriate system functionality, user-interface design and efficient employee/client education and training is becoming increasingly recognised. For cost-effective uptake and use of an IT system it must be appropriately designed and supported as a tool which allows users to efficiently achieve the goals which they want or need to achieve. Developers and providers of IT services must therefore be prepared to tackle the inherently complex problems associated with the utility, usability and work/organisational impact of computer-based tools. Meeting the utility requirements of a computer-based tool entails ensuring the usefulness of that tool for supporting real-world task completion. Meeting the usability requirements of that tool entails ensuring that the tasks to be performed with the system must be achievable within acceptable limits of costs (e.g., learning time) to the users. When the service providers are also part of the work organisation which should use a particular IT system, the organisational impact will include the job design or requirements of both the IT service providers and the intended IT users (e.g., in terms of providing or receiving education about service capabilities and training for service use).

The work organisation of an academic library is a particular example of a current rapid increase in the opportunities presented and problems posed by the continued introduction of IT services. The use of IT for on-line searching of external databases has an established history, with the appropriately trained librarian acting as intermediary between the information seeker and the electronic bibliographic service. With a growing emphasis on personal computer-based facilities there is a large recent move towards CD-ROM technology and for the information seekers to now be direct users of the IT. These library users may be novice computer and/or library service users and a consequent emerging role for the librarian is now that of trainer and educator in the use of computer-based library tools. Furthermore, this new form of support role is not restricted to bibliographic search and retrieval. The LIBERTAS system is an example of more general library automation software currently available with main-frame computing. In addition to the provision of subject and title searching LIBERTAS provides a computer-based facility for users to reserve books, see the status of any book, examine the progress of their own loans and reservations and make inter-library loan requests. The ability to integrate the system on a network enables use of LIBERTAS from remote sites in addition to within-library usage. Hence, the librarians' support role must not be confined to users located in close proximity within the library building.

Libraries are beginning to capitalise on further extensions to networking which will allow the integration of all IT services at one terminal: such as LIBERTAS, other catalogues, information on CD-ROM and standard word-processing, spreadsheet and database software. An example is the new library at Cranfield which will open in October 1992 as a purpose built, IT-rich environment , with all services being networked throughout the campus and also off-campus. Access to LIBERTAS is via dumb terminals and is therefore restricted to a monochromatic interface with a menu selection and form completion dialogue design requiring keyboard input. However, with increased support for networking of library services to personal-computers and workstations there is potential for more sophisticated human-computer dialogue designs (e.g., graphical user interfaces). Although continued use

of dumb terminals can be expected, there is a growing need for interface design solutions which will integrate various modes of electronic access.

These developments are clearly exciting for the potential advantages gained from electronic media. In particular, data is dynamic (e.g., easily corrected and updated) and there are clear benefits for information handling and speed of information access. However, previous reviews in this area have emphasised that there has been a lack of systematic effort to improve existing textual information retrieval systems by examining and understanding user difficulties (Dumais, 1988) and that for any significant improvement to be possible there is a need for more integrated design which addresses both interface and knowledge-base structure issues (Hancock-Beaulieu, 1992). The user-centred work which has been done in this area (e.g., Mears, 1991; Hancock-Beaulieu, 1990, 1992) has tended to focus on overt behaviour and objective performance and has been restricted to information search rather than all aspects of library automation available with systems such as LIBERTAS. Early work with general textual information retrieval systems have included performance measures such as initial learning, productivity and retention and has examined query generation and comprehension for different task situations. Important differences of people's needs, knowledge and vocabulary have been identified (Dumais, 1988). Specific work with on-line public access catalogues (OPACs) such as LIBERTAS has included collecting verbal data from users as they work with the system in conjunction with direct observation measures and examination of actual shelf-browsing behaviour (Hancock-Beaulieu, 1990). OPAC users have also been interviewed directly after system use, their transaction logs analysed and their search goals repeated by a trained librarian (Mears, 1991). These studies have confirmed that retrieval effectiveness is currently poor. Recommendations for improvement have focused on search mechanisms and interface design, with little attention given to the potential role of education and training for increasing efficiency with existing systems. It has been emphasised, for example, that certain search options could be offered more effectively at different stages of search and that there is a need for alternative interfaces for public and library staff usage (Hancock-Beaulieu, 1992). These performance-based studies have been consistent in identifying a tendency for users not to use on-line help and for a high proportion of search failures to be preventable through use of spelling checkers.

Mears' (1991) study was of searching behaviour of Cranfield's existing OPAC by library users of LIBERTAS. Remote access users were not included. Mears' main interface recommendations were for the improvement of on-line help and for the utilisation of function keys rather then the current requirement for multiple and sometimes arbitrary keystrokes. She identified four categories of user error: command, typographic, numeric and quitting search and five main categories of reported problems: speed of system response, journals searching, subject searching, system commands and conceptualising the system. In addition to the value of a spelling checker, the main suggestions for modifications were the availability of a subject index, networking with other facilities (e.g., CD ROM) and the use of graphics. Mears gives an example of the potential value of the use of graphics as the ability to display the physical location of a reference within the library. Similar techniques have already been developed for fiction retrieval in a public library (Pejtersen and Nielsen, 1991). Pejtersen and Nielsen have argued that development of a library graphical metaphor is best able to cope with the range of specificity of needs, available time, skills, experience, training and repertoire of heuristics held by the users of any library system. Mears also noted the extremely disparate nature of users of an academic library such as Cranfield and suggested that user perceptions appear to be influenced by their level of exposure to other bibliographic and computer-based tools, their level of computer literacy and the ways in which they search the catalogue. However, these

and other potentially important factors were only subjective conclusions based primarily on qualitative interviews. Nevertheless, this indicates the potential influence of a range of factors which effect user perceptions, although the focus in the past has been on observable searching behaviour. It also indicates that one should be able to identify concrete factors which lead to good and poor perceptions of an OPAC and which could form the basis of a strategy for improving poor perceptions of system utility and usability. The focus of the current study was therefore to develop a greater understanding of factors which influence users' perceptions of Cranfield's LIBERTAS system and to make recommendations on design improvements and training/education provision which should lead to improved uptake and use of the system.

2. Study objectives

It is known that the users of an academic library will be heterogeneous but must share a general IT system. Given previous empirical findings and anecdotal evidence from library staff that the user searching behaviour with the LIBERTAS OPAC is of less than optimum efficiency the primary objectives of this study where to determine:

- the key attitudes towards LIBERTAS
- the user characteristics which predict these attitudes
- the key areas for improvement in service provision.

Given these objectives, the study was to extend previous work in this area by focusing on user attitude rather than user performance. Additional objectives were to examine all LIBERTAS functionality rather than restrict the investigation to catalogue searching and to include both in-library and remote users of the system.

3. Procedure

This study represents a first-stage investigation into factors effecting user perceptions of LIBERTAS. Therefore, in order to explore the full range of issues considered relevant and generate quantitative data a structured interview-based survey was conducted. Sixteen interviewers conducted the survey between the 14th and 26th February 1992.

Library users of LIBERTAS were recruited either within or at the entrance/exit to Cranfield's Management Library and Science and Technology Library. The interview schedule took approximately 20-35 minutes to complete and for both libraries a suitable area for interviewing was reserved. A library photocopier *flexicard* for the value of £1 was offered to student LIBERTAS users as an incentive to participate.

Remote student users were recruited via a message displayed when first logging-on to LIBERTAS. This message gave contact details for arranging an interview appointment and offered a £5 cash incentive (Appendix 1). Remote staff users were recruited via telephone upon selection from the Institute's telephone directory. Sampling on a random basis from this source proved impractical for the time constraints of the investigation since an extremely low number of LIBERTAS users were contacted in this way (informal monitoring of LIBERTAS

usage by the library indicates that only 10% of system access is remote). Therefore a non-random approach was adopted, particularly word-of-mouth recommendation from another participant. This was accepted as none of the other sampling techniques described above were random in nature.

Sampling by quota was employed for achieving the approximate 90/10 split in library/remote access of LIBERTAS. However, no other quota sampling took place due to a lack of available information on the demographic breakdown of LIBERTAS users.

4. The Questionnaire

Questionnaire development was based on semi-structured depth interviews with library staff ($n = 4$) and LIBERTAS users ($n = 12$). This identified a number of opinion statements regarding LIBERTAS utility and usability and recommended changes to the system and service provision. The depth interviews also identified a variety of perceived factors influencing attitudes toward system usage with which the findings of previous work in this area (e.g., Mears, 1991) were integrated.

The main-stage questionnaire is shown in Appendix 2. For clarity the main components of the questionnaire can be summarised below as *user characteristic* items, *utility* items, *usability* items and *recommended change* items. However, piloting of the questionnaire ($n = 32$) identified the need to mix certain items across these four sub-components in order to maximise efficient flow of the interview and participant understanding of certain concepts involved.

4.1. User characteristic items

These items were concerned with user demographics, experience and LIBERTAS usage.

4.1.1. Demographics

Information obtained included:

- age
- status (staff or student)
  - type of staff
  - type of student
- first language.

4.1.2. Experience

Information obtained included:

- previous attendance of a library tour
- previous use of other computerised library systems
- familiarity with other computer-based technology.

4.1.3. LIBERTAS usage

Information obtained included:

- type and frequency of use of LIBERTAS and specific system functions
- type and frequency of reference to sources of help
- type and frequency of mistakes made during system usage.

4.2. Utility items

These items were concerned with users' ratings of the usefulness of LIBERTAS in helping fulfil specific tasks and their satisfaction with service provision.

4.2.1. Task completion

Information obtained included ratings of the help provided by LIBERTAS with:

- general study/job requirements
- keeping track of own use of library
- making inter-library loan requests
- keeping informed of library news
- accessing other library catalogues
- general catalogue searching and specific search options.

4.2.2. Service provision

This included information on:

- user help, education and training facilities
- system response
- recall effectiveness and precision.

4.3. Usability items

These items were concerned with users' level of agreement with opinion statements on LIBERTAS usability and ratings of the usability of system functions.

4.3.1. Opinion statements

Examples include:

- "LIBERTAS is very inflexible"
- "I easily get frustrated with LIBERTAS"
- "I am often unable to get on-line help from LIBERTAS when I most need it"

4.3.2. System functions

This included information on the ease with which users can:

- keep track of own use of library
- make inter-library loan requests
- keep informed of library news
- access other library catalogues
- perform general catalogue searching and operate specific search options.

4.4. Recommended change items

These items were expressions of opinions on the implementation of additional or modified facilities and were rated on a five-point scale ranging from *very necessary* to *not at all necessary*. Examples include:

- "A more obvious help screen prompt given on each page"
- "Placement of a simple, short directory on the use of LIBERTAS next to any terminal"
- "Availability of a thesaurus"

5. Respondents

A total of 137 LIBERTAS users were interviewed, of whom 19 were academic or research staff at Cranfield and 118 were student users of the library.

Table 1 shows this staff and student composition of the sample, along with known figures for the composition of Cranfield's actual population on the basis of personnel and registry records for the survey period. Note that personnel and registry records were not considered appropriated for assigning sampling quotas in the absence of current known figures for the demographic details of actual library or LIBERTAS users. However, a post-hoc analysis of the sample distribution shows that it was not representative in terms of type of staff ($\chi^2(1) = 6.0$, $p < 0.02$) and type of student ($\chi^2(3) = 27.7$, $p < 0.001$) but it was representative in terms of the proportion of staff to students ($\chi^2(1) = 2.3$, $p > 0.1$). In addition, the sample was representative in terms of the single quota measure for the proportion of library (92%) and remote (8%) access of LIBERTAS ($\chi^2(1) = 0.6$, $p > 0.2$).

		sample		population	
		absolute frequency	relative frequency	absolute frequency	relative frequency
staff	academic	4	27	206	58
	research	11	73	151	42
	'other'	4		n/a	
student	MSc	85	72	705	48
	MBA	12	10	339	23
	MPhil	2	2	48	3
	PhD	19	16	384	26
totals	staff	19	14	357	19
	student	118	86	1476	81
		Σ 137		Σ 1833	

Table 1: Breakdown of the sample and Cranfield population in terms of types of staff and student

6. Results

In accordance with the main study objectives the questionnaire data was analysed to provide answers to the following questions:

- what are the key attitudes towards LIBERTAS?
- do user characteristics predict these attitudes?
- what are the key areas for improvement in service provision?

Each of these questions is therefore treated separately below.

6.1. What are the key attitudes towards LIBERTAS?

Two separate question types examined users' attitudes towards LIBERTAS. The first was users' level of agreement with the opinion statements generated from the initial depth interviews. The second was users' ratings of the utility and usability of specific LIBERTAS functions and features of service provision.

For both type of rating scale the key opinions were examined by means of principle components analysis in order to determine the combinations of original items which accounted for maximum variance in opinion. For the original items in both data sets it was possible to produce a smaller number of composite opinion descriptions for both descriptive purposes and further statistical treatment.

6.1.1. Opinion statement analysis

Responses to the 17 opinion statements were reduced to 4 composite variables whilst retaining maximum variance amongst users. These 4 attitude descriptions accounted for 57 percent of the total variance amongst participant opinion.

Table 2 shows the loading of variables on these 4 principal components after varimax rotation. The variables are ordered and grouped by the size of their loading so that items with high loadings on the same attitude description appear together. In order to further facilitate interpretation loadings under 0.4 have been omitted.

The four opinion descriptions which emerge relate to the *learning effort* required, the ability to get done with LIBERTAS what users' want to get done (*goal achievement*), the use of conventional, manual methods rather than automated facilities (*manual versus computer-based methods*) and the use of *on-line help*. This is illustrated in Table 3, along with the relative frequencies of responses to the component items and their mean on a five-point scale (1 'very negative opinion' to 5 'very positive opinion').

Item	PC 1	PC 2	PC 3	PC 4
Clarity of menus	.833			
Ease of learning	.789			
Command names	.630			
Ease of use	.583			
Keyword usability	.436			
Task completion		.725		
Frustration		.706		
Inflexibility		.695		
Conventional search			.776	
LIBERTAS avoidance			.413	
Help-screen jargon				.797
Access to on-line help				.535
Reference to on-line help				.503
Percent of variance	29.0	10.0	9.3	8.4
Cumulative percentage	29.0	39.1	48.4	56.9

Table 2: Factor loadings and percentages of variance for the four principle components (PCs)

Summary Label	Actual Statement	Agree	Neutral	Disagree	Mean
Learning effort					
Clarity of menus	*The menus are clear to understand*	66	22	12	3.8
Ease of learning	*LIBERTAS is easy to learn*	79	14	7	4.0
Command names	*It is easy to remember the necessary commands to use LIBERTAS*	64	21	15	3.7
Ease of use	*LIBERTAS is easy to use*	74	18	8	3.8
Keyword usability	*The keyword system is easy to use*	60	28	12	3.7
Goal achievement					
Task completion	*It is often very difficult to complete my initial task*	18	26	56	3.5
Frustration	*I easily get frustrated with LIBERTAS*	29	25	46	3.2
Inflexibility	*LIBERTAS is very inflexible*	28	30	42	3.2
Manual versus computer-based methods					
Conventional search	*I prefer to browse the library shelves as I have a rough idea of where the materials I need are located*	27	17	56	3.5
LIBERTAS avoidance	*Whenever possible I will try to find another way of obtaining information I require without using LIBERTAS*	12	29	72	3.9
On-line help					
Help-screen jargon	*The help screens have too much jargon*	33	40	27	2.9
Access to on-line help	*I am often unable to get on-line help from LIBERTAS when I most need it*	22	25	53	3.4
Reference to on-line help	*I never read the help screens*	62	16	23	2.2

Table 3: Composition of the four opinion descriptions and descriptive statistics

6.1.2. Utility/Usability analysis

Responses to the 33 utility and usability items were reduced to 6 composite variables. These 6 opinion descriptions accounted for 52 percent of the total variance amongst the participants' perceptions of LIBERTAS.

Table 4 shows the loadings of variables on these 6 principal components after varimax rotation. From the pattern of loadings in Table 4 the six descriptions of LIBERTAS perceptions relate to the *main uses* associated with users' work (catalogue searching via subject and title requests), *author searching*, obtaining *information and inter-library loans*, *accessing other catalogues* through networks to additional libraries, *journal & classmark*

searching and *Boolean searching*. This is illustrated in Table 5, along with the mean, mode and standard deviation of the component items for the five-point scales employed (1 'very negative rating' to 5 'very positive rating').

Item	PC 1	PC 2	PC 3	PC 4	PC5	PC6
Utility of subject search	.724					
Usability of catalogue search	.699					
Utility of catalogue search	.694					
Usability of subject search	.694					
Help with day-to-day work	.644					
Usability of title search	.596					
Utility of title search	.561					
Usability of quick search		.815				
Utility of quick search		.786				
Utility of name search		.609				
Usability of name search		.554				
Usability of own use info			.818			
Utility of own use info			.663			
Utility of library news			.519			
Usability of library news			.519			
Usability of inter-library loan			.518			
Usability of other library access				.748		
Utility of other library access				.724		
Utility of underlying model				.581		
Usability of journal search					.769	
Usability of classmark search					.493	
Utility of journal search					.408	
Utility of Boolean search						.867
Usability of Boolean search						.735
Percent of variance	17.4	10.0	7.6	6.3	5.6	4.7
Cumulative percentage	17.4	27.4	35.0	41.3	46.9	51.6

Table 4: Factor loadings and percentages of variance for the six principle components (PCs)

	Mean	Mode	Standard Deviation
Main uses			
Utility of subject search	4.1	5	.95
Usability of catalogue search	3.9	4	.96
Utility of catalogue search	3.8	4	.96
Usability of subject search	4.3	5	.92
Help with day-to-day work	3.6	4	1.00
Usability of title search	4.3	5	.84
Utility of title search	3.8	4	1.06
Author searching			
Usability of quick search	4.1	5	.97
Utility of quick search	3.7	4	1.19
Utility of name search	3.4	4	1.18
Usability of name search	4.1	5	.97
Information & inter-library loans			
Usability of own usage information	3.8	4	1.21
Utility of own usage information	3.1	5	1.43
Utility of library news information	1.9	1	1.23
Usability of library news information	3.0	3	1.24
Usability of inter-library loan	3.6	4	1.15
Accessing other catalogues			
Usability of other library access	3.0	3	1.01
Utility of other library access	2.7	3	1.23
Utility of underlying model	3.3	4	1.12
Journal & classmark searching			
Usability of journal search	3.3	3	1.20
Usability of classmark search	3.4	3	1.23
Utility of journal search	3.0	3	1.12
Boolean searching			
Utility of Boolean search	2.4	1	1.40
Usability of Boolean search	2.8	1	1.46

Table 5: Composition of the six opinion descriptions and descriptive statistics

6.2. Do user characteristics predict these attitudes?

The analysis of user opinion has revealed that the variance which exists in users' negative or positive perceptions of the LIBERTAS system can be best expressed within ten composite

opinion descriptions. Perceptions related to the *learning effort* required for LIBERTAS usage and the *main uses* associated with users' work are the two dominant opinion descriptions, explaining the most variance for the opinion statement and utility/usability data sets respectively.

These two opinion descriptions were therefore selected as the main attitudes towards LIBERTAS for investigating whether certain user characteristics are important in influencing favourable or unfavourable user perceptions.

Information on user characteristics was collected within 7 main areas:

- user demographics
- type of LIBERTAS use
- frequency of use of top-level functions
- frequency of use of catalogue search functions
- level of previous related education, training and experience
- use of help facilities
- typical errors during system use.

Each of these areas was therefore examined in terms of their ability to predict attitudes towards *learning effort* and *main uses* for LIBERTAS. For each area two standard multiple regression analyses were performed to assess the ability of predicting perceptions of learning effort and main use of LIBERTAS from appropriate user characteristics.

Table 6 shows the variable composition of the seven areas of user characteristics. Of these seven areas three were identified as providing significant predictions of user attitude. These were type of LIBERTAS use and frequency of use of top-level and catalogue search functions. The results for these three areas are therefore provided in more detail below.

Variables	Characteristics Area	Attitude	Summary Regression Results	Attitude Prediction?
English as first language	*user demographics*	*learning effort*	$R^2 = 0.07$, $p = 0.13$	no
staff or student user		*main uses*	$R^2 = 0.02$, $p = 0.78$	no
academic/applied discipline of work				
most frequently used library				
typical location of LIBERTAS access				
predominance of either specific or general searching	*type of LIBERTAS use*	*learning effort*	$R^2 = 0.20$, $p = 0.005$	yes
sporadic or regular use of LIBERTAS		*main uses*	$R^2 = 0.22$, $p = 0.002$	yes
sporadic or regular use of catalogue searching				
sporadic or regular use of own library usage facility				
sporadic or regular use of inter-library loan facility				
tendency for shelve or LIBERTAS searching for a specific area				
LIBERTAS in general	*frequency of use of top-level functions*	*learning effort*	$R^2 = 0.13$, $p = 0.028$	yes
catalogue searching		*main uses*	$R^2 = 0.26$, $p < 0.000$	yes
own library usage facility				
inter-library loan facility				
library news facility				
access to other library catalogues				
title search	*frequency of use of catalogue search functions*	*learning effort*	$R^2 = 0.11$, $p = 0.092$	marginal
subject search		*main uses*	$R^2 = 0.13$, $p = 0.037$	yes
quick author/title search				
name search				
classmark search				
journal search				
boolean search				
attendance at a library tour	*level of previous related education, training and experience*	*learning effort*	$R^2 = 0.04$, $p = 0.65$	no
use of other computerised library system		*main uses*	$R^2 = 0.07$, $p = 0.33$	no
length of use of LIBERTAS				
familiarity with other computer-based tools				
level of computer literacy				
frequency of use of computer for work				
frequency of use of CD-ROMs for literature searching				
frequency of reference to on-line help	*use of help facilities*	*learning effort*	$R^2 = 0.04$, $p = 0.38$	no
frequency of reference to information leaflets		*main uses*	$R^2 = 0.03$, $p = 0.64$	no
frequency of reference library staff				
frequency of reference to own notes				
frequency of reference to another user				
giving a command which does not exist	*typical errors in system use*	*learning effort*	$R^2 = 0.06$, $p = 0.28$	no
giving a command which exists but which is inappropriate		*main uses*	$R^2 = 0.03$, $p = 0.67$	no
typographical error				
numeric error				
error when quitting search				

Table 6: Aspects of user characteristics examined and their ability to predict attitude towards LIBERTAS

6.2.1. Type of LIBERTAS use

Tables 7 and 8 show the multiple regression results for predicting the *learning effort* and *main uses* attitude, respectively, from type of LIBERTAS use. Shown are the correlations between the variables, the unstandardised regression coefficients (B) and intercept, the standardised regression coefficients (β), the squared semipartial correlations (sr^2) and R, R^2 and adjusted R^2 after entry of all six independent variables. These variables and their abbreviations in these tables are:

predominance of either specific or general searching	SPECGEN
sporadic or regular use of LIBERTAS	LIBERTAS
sporadic or regular use of catalogue searching	CATALOGUE
sporadic or regular use of own library usage facility	OWNUSE
sporadic or regular use of inter-library loan facility	ILL
tendency for shelve or LIBERTAS searching for a specific area	STRATEGY.

Variables	LEARNING (DV)	SPECGEN	LIBERTAS	CATALOGUE	OWNUSE	ILL	STRATEGY	B	β	sr^2 (Unique)
SPECGEN	.012							-.032	-.014	.00
LIBERTAS	.362	.058						.638*	.291	.05
CATALOGUE	.270	-.035	.616					.062	.028	.00
OWNUSE	.064	-.183	.244	.234				-.169	-.077	.01
ILL	.324	-.059	.255	.266	.218			.591*	.253	.06
STRATEGY	.133	.129	.099	.143	.060	.056		.152	.092	.01
							Intercept =	-1.899		
Means	.02	.51	.52	.59	.49	.33	2.33			
Standard deviations	1.10	.50	.50	.49	.50	.47	.67			R^2 = .20[a]
										Adjusted R^2 = .14
										R = .45**

** $p < 0.01$
* $p < 0.05$
[a] Unique variability = .14; shared variability = .06

Table 7: Multiple regression of type of LIBERTAS use on the attitude towards learning effort

As can be seen form Table 7, R for regression was significantly different from zero: $F(6,81) = 3.42$, $p = 0.005$. Only two of the LIBERTAS usage variables contributed significantly to the prediction of attitude to learning effort. These were whether use of the inter-library loan facility (ILL) and LIBERTAS in general (LIBERTAS) is sporadic or regular. Altogether 20% (14% adjusted) of the variability in attitude towards learning effort could be predicted by knowing responses to these six variables.

Variables	MAIN USE (DV)	SPECGEN	LIBERTAS	CATALOGUE	OWNUSE	ILL	STRATEGY	*B*	*β*	sr^2 (Unique)
SPECGEN	.160							.282	.150	.02
LIBERTAS	.396	.058						.224^	.112	.04
CATALOGUE	.371	-.035	.616					.422^	.221	.03
OWNUSE	.018	-.183	.244	.234				-.167	-.088	.01
ILL	.203	-.059	.255	.266	.218			.224	.112	.01
STRATEGY	.029	.129	.099	.143	.060	.056		-.067	-.047	.00
							Intercept =	-1.661		
Means	.05	.51	.52	.59	.49	.33	2.33			
Standard deviations	.94	.50	.50	.49	.50	.47	.67			R^2 = .22[a]
										Adjusted R^2 = .17
										R = .47**

** $p < 0.01$
* $p < 0.05$
^ $p < 0.1$
[a] Unique variability = .11; shared variability = .11

Table 8: Multiple regression of type of LIBERTAS use on the attitude towards main uses

As can be seen form Table 8, R for regression was significantly different from zero: $F(6,81) = 3.91$, $p = 0.002$. Only two of the LIBERTAS usage variables contributed significantly to the prediction of attitude to learning effort. These were whether general use of LIBERTAS (LIBERTAS) or catalogue searching (CATALOGUE) is sporadic or regular. Altogether 22% (17% adjusted) of the variability in attitude towards main uses could be predicted by knowing responses to these six variables.

6.2.2. Frequency of use of top-level functions

Tables 9 and 10 show the multiple regression results for predicting attitude towards the learning effort and the main uses of LIBERTAS, respectively, from frequency of use of top-level functions. The six independent variables and their abbreviations in these tables are:

frequency of use of LIBERTAS	LIBERTAS
frequency of use of catalogue searching	CATALOGUE
frequency of use of own library usage facility	OWNUSE
frequency of use of inter-library loan facility	ILL
frequency of use of library news facility	NEWS
frequency of use of other library catalogue access facility	ACCESS.

Variables	LEARNING (DV)	LIBERTAS	CATALOGUE	OWNUSE	ILL	NEWS	ACCESS	B	β	sr^2 (Unique)
LIBERTAS	.297							.260*	.287	.05
CATALOGUE	.151	.550						-.022	-.028	.00
OWNUSE	.108	.172	.030					.021	.027	.00
ILL	.170	.299	.309	.250				.006	.008	.00
NEWS	.146	.107	.005	.210	.221			.050	.041	.00
ACCESS	.218	.081	.103	.125	.392	.381		.144	.175	.02
							Intercept = -.905			
Means	.02	2.98	3.14	2.20	1.68	.48	.95			
Standard deviations	1.10	1.22	1.39	1.42	1.59	.90	1.34			R^2 = .13[a]
										Adjusted R^2 = .08
										R = .36*

* $p < 0.05$

[a] Unique variability = .07; shared variability = .06

Table 9: Multiple regression of frequency of use of top-level functions on the attitude towards learning effort

As can be seen form Table 9, R for regression was significantly different from zero: $F(6,100) = 2.48$, $p = 0.028$. Only one of the frequency of use variables contributed significantly to the prediction of attitude to learning effort. This was the frequency of use of LIBERTAS in general (LIBERTAS). The only other variable contributing to unique variability was frequency of access to other library catalogues (ACCESS, $sr^2 = 0.02$) . Altogether 13% (8% adjusted) of the variability in attitude towards learning effort could be predicted by knowing responses to these six variables.

Variables	MAIN USE (DV)	LIBERTAS	CATALOGUE	OWNUSE	ILL	NEWS	ACCESS	B	β	sr^2 (Unique)
LIBERTAS	.465							.273**	.351	.08
CATALOGUE	.356	.55						.100	.148	.01
OWNUSE	.057	.172	.030					-.038	-.057	.00
ILL	.247	.299	.309	.250				.069	.117	.01
NEWS	.166	.107	.005	.210	.221			.161	.153	.02
ACCESS	.038	.081	.103	.125	.392	.381		-.073	-.103	.01
							Intercept = -1.119			
Means	.05	2.98	3.14	2.20	1.68	.48	.95			
Standard deviations	1.10	1.22	1.39	1.42	1.59	.90	1.34			R^2 = .26[a]
										Adjusted R^2 = .22
										R = .51**

** $p < 0.01$

[a] Unique variability = .13; shared variability = .13

Table 10: Multiple regression of frequency of use of top-level functions on the attitude towards main uses of LIBERTAS

Table 10 shows that R for regression was significantly different from zero: $F(6,100) = 5.99$, $p < 0.000$. Only one of the frequency of use variables contributed significantly to the prediction of attitude to main LIBERTAS uses. This was the frequency of use of LIBERTAS in general (LIBERTAS). However, a further 5% of variability was unique and altogether

26% (22% adjusted) of the variability in attitude towards main uses of LIBERTAS could be predicted by knowing responses to these six variables.

6.2.3. Frequency of use of catalogue search functions

Tables 11 and 12 show the multiple regression results for predicting attitude towards the the learning effort and the main uses of LIBERTAS, respectively, from frequency of use of catalogue search functions. The seven independent variables and their abbreviations in these tables are:

frequency of use of title search	TITLE
frequency of use of subject search	SUBJ
frequency of use of quick author/title search	QUICK
frequency of use of name search	NAME
frequency of use of classmark search	CLASS
frequency of use of journal search	JOUR
frequency of use of boolean search	BOOL.

Variables	LEARNING (DV)	TITLE	SUBJ	QUICK	NAME	CLASS	JOUR	BOOL	*B*	β	sr^2 (Unique)
TITLE	-.087								-.091	-.122	.00
SUBJ	.235	.036							.221**	.266	.07
QUICK	.123	.231	-.070						.149*	.221	.03
NAME	.006	.257	.013	.426					-.032	-.044	.00
CLASS	-.021	.207	.137	.342	.278				-.157	-.127	.01
JOUR	.050	.201	.123	.028	.197	.211			.037	.050	.00
BOOL	.073	.029	.005	.133	.136	.284	.295		.056	.073	.00
								Intercept = -.843			
Means	.02	2.53	3.57	2.18	1.99	.43	1.58	.88			
Standard deviations	1.10	1.47	1.32	1.63	1.53	.89	1.50	1.42			R^2 = .11[a]
											Adjusted R^2 = .05
											R = .33^

** $p < 0.01$
* $p < 0.05$
^ $p < 0.1$
[a] Unique variability = .11; shared variability = .00

Table 11: Multiple regression of frequency of use of catalogue search functions on the attitude towards LIBERTAS learning effort

Table 11 shows that R for regression was approaching significance at the traditional level: $F(7,102) = 1.81$, $p = 0.092$. Two of the frequency of catalogue use variables contributed significantly to the prediction of attitude to learning effort. This was the frequency of use of subject search (SUBJ) and the frequency of use of quick author/title search (QUICK). These two variables explain practically all unique variability, with 11% (5% adjusted) of the variability in attitude towards the learning effort of LIBERTAS being predictable by knowing responses to the seven variables.

Variables	MAIN USES (DV)	TITLE	SUBJ	QUICK	NAME	CLASS	JOUR	BOOL	*B*	*β*	sr^2 (Unique)
TITLE	.106								.038	.059	.00
SUBJ	.220	.036							.161*	.226	.05
QUICK	.145	.231	-.070						.136*	.236	.04
NAME	.-.002	.257	.013	.426					-.069	-.111	.01
CLASS	.010	.207	.137	.342	.278				-.077	-.072	.00
JOUR	.126	.201	.123	.028	.197	.211			.103	.164	.02
BOOL	-.113	.029	.005	.133	.136	.284	.295		-.106	-.160	.01
								Intercept = -.819			
Means	.05	2.53	3.57	2.18	1.99	.43	1.58	.88			
Standard deviations	1.10	1.47	1.32	1.63	1.53	.89	1.50	1.42			R^2 = .13[a]
											Adjusted R^2 = .07
											R = .36*

* $p < 0.05$

[a] Unique variability = .13; shared variability = .00

Table 12: Multiple regression of frequency of use of catalogue search functions on the attitude towards main uses of LIBERTAS

As can be seen from Table 12, R for regression was significantly different from zero: $F(7,106) = 2.23$, $p = 0.037$. Two of the frequency of catalogue use variables contributed significantly to the prediction of attitude to main LIBERTAS uses. This was the frequency of use of subject search (SUBJ) and the frequency of use of quick author/title search (QUICK). Altogether 13% (7% adjusted) of the variability in attitude towards main uses of LIBERTAS could be predicted by knowing responses to these seven variables.

6.3. What are the key areas for improvement in service provision?

Using principal components analysis responses to the 17 opinion statements on service provision improvement were reduced to 6 composite variables. These 6 opinion descriptions accounted for 63 percent of the total variance amongst participant ratings of the suggested service provision improvements.

Table 13 shows the loading of variables on these 6 principal components after varimax rotation. As for earlier results, the variables are ordered and grouped by the size of their loading so that items with high loadings on the same attitude description appear together. Also, loadings under 0.4 have been omitted.

Item	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6
Spelling checker	.778					
Use of graphics	.711					
Thesaurus	.684					
Subject index	.640					
Exit prompt availability		.726				
Simplified help text		.692				
Use of colour		.621				
Help screen prompt		.528				
Help cards by terminals			.776			
Directory of LIBERTAS use			.763			
Training expert availability				.786		
Training video				.528		
NOT commands with Boolean					.727	
AND/OR with Boolean					.657	
Boolean information					.527	
Networking with CD ROM						.782
Printing function						.607
Percent of variance	25.4	9.0	8.6	7.1	6.7	6.2
Cumulative percentage	25.4	34.4	43.0	50.1	56.8	63.0

Table 13: Factor loadings and percentages of variance for the six principle components (PCs)

From the pattern of loadings in Table 13 the six service change descriptions which emerge relate to *additional functionality* recommended, *system prompts* which would reduce the information load placed on users, the availability of *paper-based information* support in close proximity to terminals, *training* provision, improving the ease and efficiency of *Boolean search* usage and improvements in service through *networking*. This is illustrated in Table 14, along with the mean, mode and standard deviation of responses to the component items for the five-point scales used (1 'very necessary' to 5 'not at all necessary').

Summary Label	Actual Statement	Mean	Mode	Standard Deviation
Additional functionality				
Spelling checker	*Use of a spelling checker*	3.10	3	1.37
Use of graphics	*Use of graphics (e.g., showing location in library)*	2.74	2	1.46
Thesaurus	*Availability of a thesaurus*	2.63	2	1.36
Subject index	*Availability of a subject index*	2.29	2	1.11
System prompts				
Exit prompt availability	*An exit prompt available at all screens*	2.42	1	1.32
Simplified help text	*Simplification of help screens so that they are less wordy*	2.87	2	1.31
Use of colour	*Use of colour to distinguish different options of LIBERTAS usage*	3.06	2	1.33
Help screen prompt	*A more obvious help screen prompt given on each page*	3.05	2	1.22
Paper-based information				
Help cards by terminals	*Placement of 'help cards' next to any terminal showing examples of how to use commands, formulate searches, complete forms, etc.*	2.73	2	1.30
Directory of LIBERTAS use	*Placement of a simple, short directory on the use of LIBERTAS next to any terminal*	2.84	2	1.34
Training				
Training expert availability	*Availability of training on LIBERTAS by an expert in each department*	3.46	5	1.27
Training video	*Availability of a training video*	4.05	5	1.24
Boolean search				
NOT commands with Boolean	*Use of 'NOT' commands for Boolean search*	2.55	2	1.13
AND/OR with Boolean	*Boolean search to use 'and or' rather than '/'*	2.57	2	1.22
Boolean information	*More comprehensible information about Boolean search*	2.06	1	1.17
Networking				
Networking with CD-ROM	*Networking LIBERTAS with the CD-ROM retrieval systems*	1.89	1	1.10
Printing function	*Availability of a printing function*	2.03	1	1.25

Table 14: Composition of the six service change descriptions and descriptive statistics

7. Discussion

After summarising the main results obtained the following sections will discuss the implications of these results and provide future recommendations.

7.1. Summary of results

The study results fall within the three areas of:

- attitudes towards LIBERTAS
- user characteristics which predict attitude
- key areas for improvement in service provision.

7.1.1. Key attitudes towards LIBERTAS

Analysis of the opinion statements relating to the usability of LIBERTAS identified four key attitude descriptions. These were attitude towards:

- learning effort
- goal achievement
- manual versus computer-based methods
- on-line help.

Of the individual opinion statements comprising these attitude areas only two recorded an average negative rating by the users surveyed. These were components of *on-line help* and were due to many users believing that the help screens have too much jargon and reporting that they do not read them.

The tendency was for positive ratings towards the *learning effort* involved with LIBERTAS usage, although 29% of the total variability in user perceptions could be accounted for by this topic area.

Analysis of the rating scales associated with the utility and usability of LIBERTAS functions identified six key attitude descriptions. These were attitude towards:

- the main uses to which LIBERTAS is put
- author searching
- information and inter-library loans
- accessing other catalogues
- journal and classmark searching
- Boolean searching.

Of the individual opinion statements comprising these attitude areas only four recorded an average negative rating by the users surveyed. These were the utility of library news information (a component of *information and inter-library loans*) the utility of other library

access (a component of *accessing other catalogues*) and perceptions of both the utility and usability of *Boolean searching*.

The tendency was for positive ratings of the *main uses* to which LIBERTAS is put, although 17% of the total variability in user perceptions was accounted by this area.

7.1.2. Predicting key attitudes from user characteristics

Of the seven main areas of user characteristics only three were found to have the ability to predict users' attitudes towards LIBERTAS. These were:

- type of LIBERTAS use
- frequency of use of top-level functions
- frequency of use of catalogue search functions.

The type of LIBERTAS use which predicted attitude towards learning effort was found to be general LIBERTAS usage and specific use of the inter-library loan facility. General LIBERTAS usage also predicted attitude towards the main uses, along with use of catalogue searching. In both cases a more positive attitude was associated with more regular, rather than sporadic, usage and with more frequent general use of LIBERTAS.

For the frequency of use of catalogue search functions it was found that both increased frequency of subject searching and quick author/title searching were associated with a more positive attitude to learning effort and main uses.

7.1.3. Key areas for improvement in service provision

Of the recommended improvements to the LIBERTAS service suggested by users in the current survey six primary potential change areas were identified on the basis of user opinion:

- additional functionality
- system prompts
- paper-based information
- training
- Boolean search
- networking.

Of these six areas only one had an average response which indicated that the change recommendation was not necessary. This was *training* provision through the availability of an expert on LIBERTAS in each department and via a training video. Hence, all the other areas can be considered as necessary target areas for improvement on the basis of user opinion. In particular, consensus of agreement for the necessity of *Boolean search* and *networking* improvements were identified. More comprehensible information about Boolean searching via LIBERTAS was considered necessary, along with networking LIBERTAS with CD-ROM retrieval systems and the availability of a printing function.

7.2. Main conclusions and implications

On the whole the results of this study are very positive. A primary conclusion is that general user perceptions of the utility and usability of LIBERTAS are positive but indicate that room for improvement exists. Indeed, the study has been successful in identifying specific areas where user perceptions indicate inefficiencies in service provision due to inadequacies in LIBERTAS utility and usability and can provide concrete recommendations for improvements from the users' perspective.

The two main attitude dimensions accounting for the most variability in users' perceptions were found to relate to opinions on the learning effort involved in using LIBERTAS and the main uses to which LIBERTAS can be put. For these two areas it was possible to predict more positive opinions on the basis of more regular use of LIBERTAS for making inter-library loan requests and for catalogue searching (in particular, more frequent use of subject and quick author/title search facilities). It is therefore encouraging to identify that increased use is associated with increased satisfaction rather than, for example, increased frustration.

It is concluded that user perceptions of learning effort and LIBERTAS main uses can only be predicted on the basis of regularity and frequency of system use and not also on the basis of the user demographics and levels of related education, training and experience measured. Nor can these user perceptions be predicted by knowing users' use of help facilities and typical reported errors when working with LIBERTAS. This therefore does not support the subjective conclusion offered by Mears (1991) that user perceptions are influenced by their level of exposure to other computer-based tools and their computer literacy, nor the proposed difficulty in meeting the diverse needs of bibliographic searchers suggested by Dumais (1988). This is thus an encouraging result since the problem does not seem to be as complex as previously believed. However, it should perhaps be noted that, although being a heterogeneous population in many respects, Cranfield is a purely postgraduate university and its library users may have relatively similar work support needs in comparison with the users of many other libraries. In addition, the sampling employed does not allow conclusions to be drawn confidently beyond the current study participants.

A particular implication of these results is that there are little or no gains in user satisfaction to be expected by targeting specific user or potential user sub-groups. Of the existing user population the sporadic and infrequent user should be targeted if additional education and training is to be offered. However, it is not possible to infer how the apparent benefits of regular and frequent use can be translated into benefits for the new user. Indeed, it may not be regular use and increased familiarity that increases positive perceptions but some other factor which is associated with this working practice. If increased familiarity with LIBERTAS is the key factor than an implication for service provision would be to actively promote hands-on experience with the system for new users; for example, by offering practical training workshops with actual individual access to LIBERTAS rather than a more verbal, conceptual overview provided during a library tour.

Training, however, was the one area of potential improvement which was not considered necessary by the users surveyed. Training was one of six service change descriptions which emerge from user responses to the individual items of the questionnaire and which may offer a useful framework for future service development. This framework makes explicit the areas of LIBERTAS functionality to support actual user goals, system prompts which can improve the general performance of interacting with the LIBERTAS interface and the special area of

supporting the complexity and power of Boolean catalogue search. Two further areas are the potential support provided by paper-based material in the proximity of LIBERTAS terminals and the potential advantages offered by networking. These key areas thus differ in the degree to which they can be effected by Cranfield library staff rather than requiring actual changes to LIBERTAS software by the product developers. However, with the immanent provision of an improved networking infrastructure at Cranfield these results suggest that one can look forward to further improved user perceptions of service provision. In addition, the opportunity for improving the location and content of paper-based help should be taken in addition to improving the wording and layout of on-line help text. The current investigation confirms previous related studies which have reported the lack of effective use to which on-line help is put. It also emphasises the extent to which users still wish to have paper-based support for computer-based tasks.

Any implementation of these recommended changes should be empirically monitored to evaluate outcomes and assist future decisions on library IT provision and to this end many items in the questionnaire developed for the current study should provide a basis for further data collection. Indeed, the current results also contribute to future work by guiding scope for refining the current questionnaire. In particular, statistical identification of the main opinion descriptions have revealed how the questionnaire can be reduced in length whilst still covering the main opinions which should be measured.

Although an objective of this study was to extend previous work on library catalogue searching by addressing user attitude rather then user performance, it would clearly be of value to examine the relationship between user perceptions of LIBERTAS and actual user performance with the system (e.g., using system logging and expert observation of user behaviour at the terminal). Furthermore, for the empirical monitoring of future library implementations and modifications it would be desirable to integrate a refined method for measuring user perceptions with appropriate performance measures. Development of this integrated test battery would then provide a comprehensive basis for system assessment.

7.3. Summary of recommendations

The following recommendations are organised according to appropriate areas of service provision identified by student opinion of recommended changes (Table 14). An additional category below is also concerned with recommendations for future research and development. These recommendations are restricted to those applicable to service providers (i.e., mainly library staff) and exclude recommendations which would entail revisions to the actual software by the product developers.

7.3.1. Functionality

- reasons for the poor perceived utility of *library news* should be explored and rectified
- reasons for the poor perceived utility of *other library catalogue access* should be explored and rectified.

7.3.2. System prompts

- an exit prompt should be available on all screens
- help screens should be simplified to be less wordy and to avoid jargon.

7.3.3. Paper-based information

- have paper-based information available immediately next to LIBERTAS terminals
- provide distribution of paper-based information to remote users
- paper-based information should cover:
  - uses of LIBERTAS (i.e., what can be achieved with the system)
  - how to achieve goals (i.e., how to use commands, formulate searches, complete forms, etc.).

7.3.4. Training

- blanket education/training should be sufficient (i.e., rather than selective interventions on specific sub-groups)
- encourage as much hands-on experience as possible from the start.

7.3.5. Boolean search

- on-line and paper-based material should provide straightforward 'getting started' information about Boolean searching.

7.3.6. Networking

- with CD-ROM bibliographic retrieval systems
- with printing facility (if possible with current software capabilities).

7.3.7. Future research and development

- examination of the association between positive perceptions of LIBERTAS and more regular and frequent system use to identify implications for supporting new and existing users
- extension of the current survey to include:
  - a more representative sample (once information on library user demographics is available)
  - further refinement of the questionnaire for the measurement of user perceptions
- development of suitable objective performance measures which can be combined with the subjective measures to form an integrated and readily applied test battery

- application of a test battery for empirical evaluations of future implemented service changes.

8. Acknowledgements

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10. Appendices

Appendix 1: Log-on message for recruitment of remote users

EARN £5 (EASILY!) BY HELPING MSc GROUP PROJECT

If you are a LIBERTAS user we would like to interview you about your views and opinions of the system. The interview will take about 30 minutes and will be arranged at a time convenient for you between 14th February and 26th February. Students taking part will receive £5 for their help (although members of staff are also asked to participate!)

Please telephone MARIE BREEN or ANN SODEN on ext. 2228/9 (Applied Psychology Unit) to arrange an interview time. Thank you.

Appendix 2: Mainstage questionnaire

Interviewer:

Interview of LIBERTAS users

We are performing a study of the use of LIBERTAS at Cranfield and users' perceptions of the system.

The information for which you are asked will be treated in the strictest of confidence and will be anonymous.

First of all I would like to ask some questions about yourself and your use of the LIBERTAS system and the library.

Male (1) Female (2)

Are you a member of staff or a student?

Staff (1) Student (2)

If you are a member of **staff:**

Academic (1) Research (2) Other (3) (please state)

If you are a student:

What is the title/subject of your current course?

1st yr MSc (1)	2nd yr MSc) (2)	MPhil (3)	MBA (4)	1st yr PhD (5)	2nd yr PhD (6)	3rd yr PhD (7)	4 yr or more PhD (8)	other (specify) (9)

Which school?

CoA (1)
SIMS (2)
SoM (3)
SME (4)
Biotechnology (5)
CIM Institute (6)
Computer Centre (7)
Other (please state) (8)

With what discipline area do you associate yourself?

Engineering (1)
Management (2)
Social Science (3)
Other/more specific (please state) (4)

What is your first language?

English (1) other (2)
(please specify)

Have you attended a library tour at Cranfield?

Yes (1) No (2)

If yes how long did the tour last? .....hours

how long did you spend with LIBERTAS? .....mins/hours

Have you used any other computerised library system before (even if LIBERTAS elsewhere)?

Yes (1) No (2)

If yes how would you rate the old system in terms of:

	not at all helpful				very helpful
how much it helped your work	1	2	3	4	5

	very difficult to use				very easy to use
how easy it was to use	1	2	3	4	5

If it was not LIBERTAS do you know what is was called?

Which library do you use the most?

Science & Technology (1) Management (2) equal usage (3)

would you describe your use of LIBERTAS as?

irregular/sporadic (1) regular (2)

very infrequent 1 2 3 4 5 very frequent

Do you typically use LIBERTAS to search for a specific reference or to investigate a general area?

Specific (1) General (2)

How frequently do you use these functions?

catalogue use

irregular/sporadic (1) regular (2)

never 0 1 2 3 4 5 very frequently unaware existed (9)

own use of library

irregular/sporadic (1) regular (2)

never very frequently unaware existed

0 1 2 3 4 5 (9)

Inter-library loans

irregular/sporadic (1) regular (2)

never very frequently unaware existed

0 1 2 3 4 5 (9)

Library news

irregular/sporadic (1) regular (2)

never very frequently unaware existed

0 1 2 3 4 5 (9)

Access to other library catalogues

irregular/sporadic (1) regular (2)

never very frequently unaware existed

0 1 2 3 4 5 (9)

With specific reference to the catalogue function, frequently do you use the following?

Title

never very frequently unaware existed

0 1 2 3 4 5 (9)

Subject

never very frequently unaware existed

0 1 2 3 4 5 (9)

Quick author/title

never very frequently unaware existed

0 1 2 3 4 5 (9)

Name

never very frequently unaware existed

0 1 2 3 4 5 (9)

Classmark

never very frequently unaware existed

0 1 2 3 4 5 (9)

Journal

never very frequently unaware existed

0 1 2 3 4 5 (9)

Boolean

never very frequently unaware existed

0 1 2 3 4 5 (9)

If you were interested in a specific area would you:

go directly to the shelves and browse the available titles (1)

browse through LIBERTAS (2)

both (3)

For how many months/years have you been using LIBERTAS?

.....mths/yrs

Where do you typically use LIBERTAS?

Management library (1)	S & T library (2)	own office (3)	other's office (4)	communal area (5)

How familiar are you with other computer-based tools / software?

not at all familiar — very familiar

1 2 3 4 5

How do you consider your level of computer literacy?

very low — very high

1 2 3 4 5

How frequently do you use a computer as part of your work/study?

never — very frequently

1 2 3 4 5

How frequently do you use CD-ROMs for literature searching?

never				very frequently
1	2	3	4	5

Now I would like to ask some questions about

how easy you find it is to use the LIBERTAS system

how useful you find the LIBERTAS system for helping your work

Please rate your level of agreement or disagreement with the following statements:

	strongly agree				strongly disagree	
LIBERTAS is very inflexible	1	2	3	4	5	
I easily get frustrated with LIBERTAS	1	2	3	4	5	
Whenever possible I will try to find another way of obtaining information I require without using LIBERTAS	1	2	3	4	5	
The keyword system is easy to use	5	4	3	2	1	(0)
I prefer to browse the library shelves as I have a rough idea of where the materials I need are located	1	2	3	4	5	

	strongly agree				strongly disagree	
LIBERTAS is easy to use	5	4	3	2	1	
LIBERTAS is easy to learn	5	4	3	2	1	
The menus are clear to understand	5	4	3	2	1	
It is often very difficult to complete my initial task	1	2	3	4	5	
It is easy to remember the necessary commands to use LIBERTAS	5	4	3	2	1	
I never read the help screens	1	2	3	4	5	
The help screens have too much jargon	1	2	3	4	5	(0)
I am often unable to get on-line help from LIBERTAS when I most need it	1	2	3	4	5	(0)

To what extent do you feel that LIBERTAS helps you:

	not at all useful				very helpful	
with your studies/job here at Cranfield?	1	2	3	4	5	(0)
catalogue searching	1	2	3	4	5	(0)
keeping track of own use of library	1	2	3	4	5	(0)
making ILL requests	1	2	3	4	5	(0)
keeping informed of library news	1	2	3	4	5	(0)
accessing other library catalogues	1	2	3	4	5	(0)

How would you rate the usability of the following:

	very difficult to use				very easy to use	
catalogue searching	1	2	3	4	5	(0)
keeping track of own use of library	1	2	3	4	5	(0)
making Inter-Library Loan requests	1	2	3	4	5	(0)
keeping informed of library news	1	2	3	4	5	(0)
accessing other library catalogues	1	2	3	4	5	(0)

How useful do you find the following facilities:

	not at all useful					very useful
Title search	1	2	3	4	5	(0)
Subject search	1	2	3	4	5	(0)
Quick author/title search	1	2	3	4	5	(0)
Name search	1	2	3	4	5	(0)
Classmark search	1	2	3	4	5	(0)
Journal search	1	2	3	4	5	(0)
Boolean search	1	2	3	4	5	(0)

How easy or difficult do you find it to do the following:

	very difficult					very easy
Title search	1	2	3	4	5	(0)
Subject search	1	2	3	4	5	(0)
Quick author/title search	1	2	3	4	5	(0)
Name search	1	2	3	4	5	(0)
Classmark search	1	2	3	4	5	(0)
Journal search	1	2	3	4	5	(0)
Boolean search	1	2	3	4	5	(0)

Do you ever refer to the following for help:

	every time I use it				never
on-line help	1	2	3	4	5
library LIBERTAS information leaflets	1	2	3	4	5
library staff	1	2	3	4	5
your own notes taken previously	1	2	3	4	5
another user	1	2	3	4	5

Do you ever make the following types of mistakes:

	never				very frequently	
giving a command which doesn't exist	1	2	3	4	5	(0)
giving a command which exists but which is inappropriate	1	2	3	4	5	(0)
typographical	1	2	3	4	5	(0)
incorrect Boolean formulation	1	2	3	4	5	(0)
numeric	1	2	3	4	5	(0)
quitting search	1	2	3	4	5	(0)

Please rate the usefulness of the following:

	poor					excellent
Speed of system response	1	2	3	4	5	(0)
on-screen help	1	2	3	4	5	(0)
printed help information	1	2	3	4	5	(0)
assistance from library staff	1	2	3	4	5	(0)
library tour	1	2	3	4	5	(0)
your understanding of the underlying logic of the system	1	2	3	4	5	(0)

How well does the stock of material in the library meet the literature requirements of your work?

very poorly					very well
1	2	3	4	5	

How satisfied are you with the recall effectiveness of library material retrieval?

not at all satisfied					very satisfied
1	2	3	4	5	

How satisfied are you with the overall relevance of the references produced by your searches?

not at all satisfied					very satisfied
1	2	3	4	5	

Finally I would like to ask your view about the following possible changes to the LIBERTAS system.

How necessary do you think the implementation of the following facilities within LIBERTAS are:

	very necessary					not at all necessary
A more obvious help screen prompt given on each page	1	2	3	4	5	(0)
Placement of a simple, short directory on the use of LIBERTAS next to any terminal	1	2	3	4	5	(0)
Placement of 'help cards' next to any terminal showing examples of how to use commands, formulate searches, complete forms, etc.	1	2	3	4	5	(0)
Availability of a training video	1	2	3	4	5	(0)
More comprehensible information about Boolean search	1	2	3	4	5	(0)
Availability of a printing function	1	2	3	4	5	(0)
Availability of training on LIBERTAS by an expert in each department	1	2	3	4	5	(0)
Use of 'NOT' commands for Boolean search	1	2	3	4	5	(0)

	very necessary					not at all necessary
Boolean search to use 'and or' rather than '/'	1	2	3	4	5	(0)
An EXIT prompt available at all screens	1	2	3	4	5	(0)
Simplification of help screens so that they are less wordy	1	2	3	4	5	(0)
Use of colour to distinguish different options of LIBERTAS usage	1	2	3	4	5	(0)
Use of graphics (e.g., showing location in library)	1	2	3	4	5	(0)
Use of a spelling checker	1	2	3	4	5	(0)
Availability of a subject index	1	2	3	4	5	(0)
Networking LIBERTAS with the CD-ROM retrieval systems	1	2	3	4	5	(0)
Availability of a thesaurus	1	2	3	4	5	(0)

What sort of help do you think you would benefit from most in your use of LIBERTAS?

Is there a way the system can be introduced more effectively?

Of the information that you require to assist you in your library usage, how much of this is provided by LIBERTAS

none				almost all of it
1	2	3	4	5

What was your age last birthday? .....

Finally are there any other comments which you would like to make about the LIBERTAS system or this questionnaire?

Thank you very much for your co-operation

Appendix 3: Descriptive statistics for LIBERTAS usage

Variable	Dichotomy, Scale Range Points or Units of Measurement	Mean &/or Relative Frequency	Standard Deviation
First language	English - other	.23	.42
Attendance at a library tour	yes - no	.39	.49
Length of library tour	minutes	44.60	21.20
Length of time spent with LIBERTAS on library tour	minutes	10.50	8.30
Experience with other computerised library system(s)	yes - no	.37	.49
library used most	Science & Technology Management Equal usage	67.20 26.30 6.60	n/a n/a n/a
Use of LIBERTAS	sporadic - regular	.52	.50
Frequency of use of LIBERTAS	1 very infrequent 5 very frequent	2.98	1.21
Main search method	specific - general	.51	.50
Use of catalogue	sporadic - regular	.59	.49
Frequency of use of catalogue	1 very infrequent 5 very frequent	3.14	1.39
Use of own library usage facility	sporadic - regular	.49	.50
Frequency of use of own library usage facility	1 very infrequent 5 very frequent	2.20	1.42
Use of inter-library loan facility	sporadic - regular	.33	.47
Frequency of use of inter-library loan facility	1 very infrequent 5 very frequent	1.68	1.59
Use of library news facility	sporadic - regular	.06	.24
Frequency of use of library news facility	1 very infrequent 5 very frequent	.48	.90
Use of access to other library catalogues	sporadic - regular	.12	.33
Frequency of use of access to other library catalogues	1 very infrequent 5 very frequent	.95	1.34
Frequency of use of title search	1 very infrequent 5 very frequent	2.53	1.47
Frequency of use of subject search	1 very infrequent 5 very frequent	3.57	1.33
Frequency of use of quick author/title search	1 very infrequent 5 very frequent	2.18	1.63
Frequency of use of name search	1 very infrequent 5 very frequent	1.99	1.53
Frequency of use of classmark search	1 very infrequent 5 very frequent	.43	.89
Frequency of use of journal search	1 very infrequent 5 very frequent	1.58	1.50
Frequency of use of Boolean search	1 very infrequent 5 very frequent	.88	1.42
Strategy for searching a specific area	use of shelves use of LIBERTAS both	11.00 44.90 44.10	n/a n/a n/a
Length of time of LIBERTAS usage	months	7.60	9.00
Familiarity with other computer-based tools	1 not at all familiar 5 very familiar	3.57	1.28
Level of computer literacy	1 very low 5 very high	3.50	1.14
Frequency of use of computers for work/study	1 very infrequent 5 very frequent	3.89	1.05

Variable	Dichotomy, Scale Range Points or Units of Measurement	Mean &/or Relative Frequency	Standard Deviation
Frequency of use of CD-ROMs for literature searching	1 very infrequent 5 very frequent	2.06	1.23
Frequency of reference to on-line help	1 every time 5 never	4.21	1.13
Frequency of reference to information leaflets	1 every time 5 never	4.40	1.03
Frequency of reference to library staff	1 every time 5 never	3.25	1.18
Frequency of reference to own notes	1 every time 5 never	4.58	.81
Frequency of reference to another user	1 every time 5 never	4.02	1.12
Frequency of making the error type of giving a command which does not exist	1 very frequently 5 never	3.34	1.24
Frequency of making the error type of giving a command which exists but which is inappropriate	1 very frequently 5 never	3.41	1.19
Frequency of making a typographical error	1 very frequently 5 never	2.99	1.15
Frequency of making an error through incorrect Boolean formulation	1 very frequently 5 never	3.54	1.36
Frequency of making a numeric error	1 very frequently 5 never	4.20	.92
Frequency of making an error which quitting a search	1 very frequently 5 never	3.89	1.18