Abstract
The Library Impact Data Project was a six month project funded by JISC and managed by the University of Huddersfield to investigate the hypothesis that: 'There is a statistically significant correlation across a number of universities between library activity data and student attainment'. E-resources usage, library borrowing statistics and library gate entries were measured against final degree award for 33,074 undergraduate students across eight UK universities. The research successfully demonstrated a statistically significant relationship between library resource use and level of degree result; however any conclusions drawn are not indicators that library usage and student attainment have a causal relationship.

Introduction
The current financial climate has had a major impact on resource allocation to libraries. In the UK the recent Comprehensive Public Spending Review[1], the Browne Review of Higher Education Funding and Student Finance[2] and the increases in university fees have focussed the need to produce more critical evaluation of university quality in terms of teaching and provision. As a result, academic libraries need to work increasingly towards demonstrating value and excellence to students and funding bodies[3] while providing students with high quality facilities and support with less cost to the university.

Based on original research at the University of Huddersfield, which investigated the non/low use of library resources, the Library Impact Data Project was a six month JISC (Joint Information Systems Committee) funded project to investigate the hypothesis that: 'There is a statistically significant correlation across a number of universities between library activity data and student attainment'. The project looked at usage data of 33,074 undergraduate students across eight UK universities. E-resources usage, library borrowing statistics and library gate entry were measured against final degree award. The research successfully demonstrated a statistically significant relationship between library resource use and level of degree result; however any conclusions drawn are not indicators that library usage and student attainment have a causal relationship. The article also discusses issues that need to be considered when looking at the data in more depth and further research that could be undertaken.

Literature Review
Investigations into the relationship between library use and undergraduate student attainment in Higher Education, have, up until recently, been uncommon. Much of the research relating low library resource use and its potential impact was undertaken in 1960s and 70s, with key analyses by the likes of Barkey[4], Lubans[5] and Mann[6], and with Knapp[7] reporting on devising a way of analysing and embedding library usage into the college student culture. Current research is predominantly based around school library use linked to student achievement. In a sample of 50,000 elementary school students Ontario Library Association[8] looked for a link between school library resources, reading tests, and standardised tests, finding a correlation between library staffing and reading achievement. Additionally, they found that a reduction in library staff correlated with students engaging less with reading. Farmer[9] examined 60 Southern Californian schools, using student standardised reading scores against library training provision, and found that library training offered in information access had a strong relationship with reading scores. Dent found similar relationships between school library use and achievement in her work in Uganda[10], discovering that library access resulted in students attaining higher scores in some subjects than those with no access, despite the time spent on reading being similar overall.

Researchers have also considered the relationship between library usage and successful outcomes for academics. This is often part of an effort to reinforce the importance of the library: for example, Tenopir[11] emphasises the need to consider measuring the value of libraries, rather than merely marketing them as important, to remind users of what libraries can do for them as a population, and as investors in their costs (be it via taxes for public libraries or tuition fees for academic libraries). Tenopir has more recently been involved in specifically examining academic libraries[12], surveying faculty to measure the link between citation use, reading and seeking

information with grant-related activities, finding the library supports key academic research activities and thus can be considered to make a vital contribution to university value[13]. Additionally, Tenopir and Volentine[14] have demonstrated that academic libraries supply extensive resource provisions for materials for their university's research staff, with a particular focus on those who have received rewards or recognition for their work. Just under a half of all materials read by highly successful academics, including two thirds of all journal articles are retrieved via the university library: 17% of materials obtained would not have been available elsewhere, with the library providing time saving search software and an extensive online collection, thus allowing staff to concentrate on reading rather than finding.

Some studies have begun to look at the relationship between university library usage and undergraduate student outcomes, but have been limited by a lack of data on e-resource usage. De Jager focussed on the borrowing of books, including specific collection types (short loan and standard stock)[15, 16]. Some courses were found to correlate borrowing with final passing grade but further investigation of high achieving students identified discrepancies between usage for specific courses: science high achievers borrowed very little from the standard stock, while humanities high achievers borrowed at high levels. De Jager points out that further investigation is necessary to discover where electronic resources play a part in achievement. Han et al[17] have looked also into academic library use, comparing usage with grade point averages (GPA) at the Hong Kong Baptist University. They examined the borrowing habits of 8701 graduates between 2007 and 2009, specifically books and AV materials, finding a positive significant relationship between borrowing and GPAs. Emmons and Wilkinson[18] used a sample of 99 U.S. academic libraries to investigate the impact of libraries on student performance. They demonstrated the ratio of professional library staff to full time students had a statistically significant relationship to both student retention and graduation rates. However, both Han et al and Emmons and Wilkinson lack information on e-resource use.

Over the past few years research has been gathered at Huddersfield suggesting a relationship between overall library use and attainment, including e-resource usage. However, this research lacked statistical confirmation of said relationship[19, 20]. Pattern[21] additionally conducted initial basic analysis of usage suggesting e-resource access at moderate levels does not always lead to higher level degree attainment. Work at the University of Wollongong[22] has also been investigating the link between attainment and library resource usage, with early results suggesting there is a link[23].

In the United States, Megan Oakleaf's work for the Association of College and Research Libraries[24] emphasises the importance of utilising, amongst many other measures, student achievement in relationship to library resource provisions, information skills teaching and qualified staffing levels. The report embraces the use of evidence-based practice in libraries, and advocates the use of cross-campus collaborations to gather data on scores and registrar records. Academic libraries in particular are considered in terms of financial value and impact on research and learning, but as new students emerge, service is also emerging to become a key consideration[25]. Value is shifting towards librarian expertise and experience rather than the collections the library houses, but also how the library experience and interactions with staff and resources changes the information seeker and modifies their knowledge and helps them in achieving something in the process.

It is important to note that other considerations need to be factored for when examining the link between libraries and degree results; the relationship cannot be considered a causal one, however, early work by both Huddersfield and Wollongong suggests the link is worthy of further investigation.

Background

The University of Huddersfield is a medium sized university in the north of England of around 23,000 students and more than 800 academic staff spread across seven Schools and two

campuses. The University has a strong history of widening participation and a growing international research portfolio. Computing and Library Services (CLS) at the University of Huddersfield has undertaken a number of studies investigating the usage of library resources over the past ten years, in addition to analysing usage through exercises such as the annual SCONUL statistics questionnaire return[26] and as a means of measuring value for money for e-resources, such as cost per usage.

In 2009 a project group was formed at the University of Huddersfield to re-visit work that had originally been undertaken as part of an equality impact assessment, which looked at usage of library resources. The project group's remit was to investigate non/low usage of libraries resources; as such the team looked at three main indicators:

- Book loans using data from the Horizon Library Management System

- Access to e-resources using click throughs from MetaLib, which was Huddersfield's e-resource system at the time of the initial research

- Access to the library building using statistics from the Sentry gate entry system

The results of this analysis showed that, for all three indicators above, non/low-usage appears to range from 30% to 50% over a four year period. Similarly to the research findings of Bridges[27], the study found that some disciplines used library resources less than others; figure 1 shows one of the original Huddersfield non/low-usage charts for the School of Human and Health Sciences. This led the project group to consider that resources, previously thought to be good value for money, e.g. e-journals, aggregated content etc. could be made to work much harder if non/low-users could be engaged.
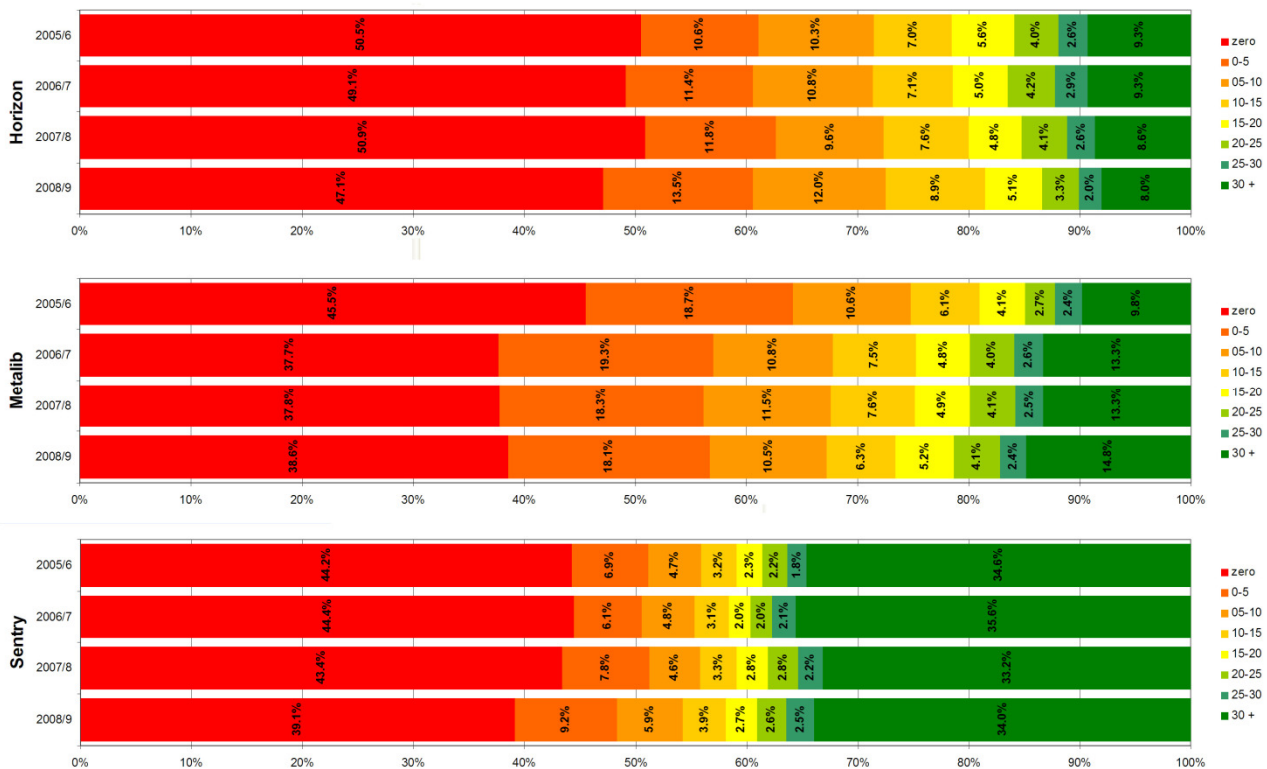

Figure 1 Non/low-usage data chart for the School of Human and Health Sciences[28]

It was suggested that it would be interesting to see if there was a relationship between the usage shown above and final student grade and it was agreed to combine this data with final grades for full time undergraduate students. The group looked at student attainment and usage for students between 2005/6 and 2008/9. In order to eliminate potential anomalies, the project discounted distance learners, post graduates, part time students, sandwich courses, short courses and courses with low numbers where anonymity could not be guaranteed. At this very early stage the team noticed what appeared to be a relationship between usage and attainment, for both e-resources usage and library borrowing.

Data were produced for each course in the university and then presented to the School's Teaching and Learning Committees for discussion. This was seen as a potentially sensitive issue and it was stated that this did not show a cause and effect relationship, for example, a number of other circumstances will affect student attainment, not least the quality of the teaching. However, academics were very supportive of the data and in some cases used it with students to encourage more use of the library's resources. This data was then presented at the 2010 UKSG Conference in Edinburgh[29], where colleagues in other universities were asked for comment. Whilst this presentation attracted a great deal of interest, with a number of universities approaching Huddersfield in order to benchmark against the data, it was also suggested that the data had not yet been tested for statistical significance and it was therefore not yet known if the experience at Huddersfield was a function of the sample data used, rather than a true reflection of a relationship existing in the wider population.

In late 2010, as part of the JISC Information Environment Programme 2009-11[30], the University of Huddersfield, along with seven partners: University of Bradford, De Montfort University, University of Exeter, University of Lincoln, Liverpool John Moores University, University of Salford and Teesside University were awarded funding for the Library Impact Data Project (LIDP), which aimed to support the hypothesis that:

'*There is a statistically significant correlation across a number of universities between library activity data and student attainment*'

Method

Aims and objectives

By supporting the hypothesis, the LIDP aimed to give a greater understanding of the link between library activity data and student attainment, which would show a tangible benefit to the higher education (HE) community. However, as stated above, it is important to note that any relationship between use and attainment is not yet proven to be a causal relationship and there will be other factors which influence student attainment. Table 1 shows the four work packages that the project undertook. The LIDP reported in a series of blog posts under eight pre-arranged tags and a final report[31], this method of reporting allowed the project to continuously update on its progress.

Work package	Description
1. Project reports and outputs	In guidance issued from the programme manager for the Activity Data strand, all projects are required to create a number of blog posts throughout the project

2. Data collection	To supply partners with details of activity data required To seek advice from JISC Legal regarding open data and data protection For partners to supply activity data for collation Release of data under Open Data Commons Licence
3. Analysis of data	Analysis of data from partners Collation of focus group data
4. Evaluation	Business Plan for future work Issues and recommendations report

Table 1. Library Impact Data Project work packages

Legal issues
From the outset of the project, data protection issues were seen as a potential risk and were discussed with JISC Legal and the University of Huddersfield's Legal and Data Protection Officers. The primary aims were to ensure data was maintained as anonymous due to its sensitive nature, and to ensure data was obtained in a way that abided by legal and university regulations with notice provided to students that their resource use may be measured. The data has been fully anonymised and made available for use as part of an open data agreement. Small courses where the cohort is smaller than 35 or where only 5 or fewer students attained a specific degree result were excluded from the data to prevent identification.

Quantitative data
Due to the short timescale of the project, potential issues with data were anticipated at the proposal stage. A minimum requirement for data was defined as two out of the three indicators of e-resource use, book borrowing statistics and library entry. It was felt that a minimum of two requirements (table 2) would reduce risk to the project, and it was hoped that if participants did run into difficulties they would be able to provide at least one set of data versus attainment.

Data Requirements for Project Partners	
All data required for at least one academic year, e.g. 2009/10	

Mandatory data:	• academic year of graduation e.g. *2009/10* • course title • length of course in years • type of course, e.g. undergraduate • grade achieved[a] • school/academic department

At least two sets of data are mandatory	• number of items borrowed from library (excluding renewals)
	
	    ○ either the total number borrowed by that student
	
	    ○ or separate values for each academic year
	
	 • number of visits to the library
	
	    ○ either the total number of visits by that student
	
	    ○ or separate values for each academic year
	
	 • number of logins to e-resources (or some other measure of e-resource usage)
	
	    ○ either the total number of logins made by that student
	
	    ○ or separate values for each academic year

[a] The UK uses degree classifications; First, Upper Second, Lover Second, Third and Pass. There is no official conversion to U.S. Grade Point Average (GPA), however, the Fullbright Commission provide an unofficial chart with approximate grade conversions between UK classifications and U.S. GPA[32].

Table 2 Data Requirements for Project Partners

As anticipated a number of partners did run into some difficulties with the data. In addition the capture of the data itself took a lot longer than anticipated. However, all partners were able to provide at least one set of data across multiple years, one partner was also able to provide computer log on data.

Due to the nature of the data provided by the partners, i.e. degree classifications rather than percentage scores, it was not possible to run tests such as regression analysis or ANOVA, which

require continuous or interval data. Therefore, degree results were considered as groups of students, allowing them to be compared for relationships using the Kruskal-Wallis (KW) test. While analysing the data in this way does not prove a correlation, it does test for the presence of a relationship, and this was considered sufficient to the purposes of the research.

The analytical process involved several steps in order to measure whether a significant relationship exists between result and library use (see table 3). The process was run for each set of data (i.e. library entries, electronic resource access, and book borrowing), for each institution, as well as combining all institutions' data, comparing each set with degree results. As the data was provided in large samples, the Monte Carlo Estimate was utilised to test simulated samples of the data repeatedly to ensure a significant result. All analysis bar the Mann-Whitney test was measured at a significance level of 95% (p=0.05). The Mann-Whitney test was measured at a significance of p=0.05 divided by the number of times it was conducted for each set of data e.g. if three comparisons of book borrowing levels were made, the level required to produce a significant result for each comparison would be 0.0167[33].

Test stage	Purpose
Kolmogorov-Smirnoff test	Proves the data does not have a normal distribution, and thus that the KW test is a suitable measure of relationship
Kruskal-Wallis test	States whether there is a difference between groups of results i.e. between degree results
Boxplot analysis	Provides visual data in order to plan comparison of specific groups
Mann-Whitney test	Tests for a difference between specific groups
Calculation of effect size	Measures how large the difference is between those groups

Table 3. Stages of analysis for measuring whether a relationship exists between degree result and library usage

Qualitative data
Qualitative data collection was designed to gauge what obstacles discouraged use, and what provisions/support encouraged use, in order to understand further how to engage more with students and perhaps thereby aid them in attainment. Each institution was asked to run focus groups to gather information about why students may or may not choose to use library facilities or resources. A set of questions was designed to gather data on how and when students use the library, whether they had any difficulties doing so, how they felt their usage compared to others on their course and whether they felt the library resources and environment met their study needs. Guidelines were provided with an introductory speech, as well as ethical information for attendees and consent forms. Each institution was allowed to modify questions to reflect their own resource provision, and to ask additional questions for their own benefit[34]. Data gathered from the groups was coded in a style based on grounded theory: the transcripts were initially examined for themes arising, and the themes refined to more specific classifications throughout several readings. Codes were then assigned on a final reading, with either single or multiple codes applied to each

statement. Time restrictions meant that only a comparatively basic analysis of qualitative data could be conducted, with coding assessed on the basis of frequency of appearance.

Additionally, each student attending a focus group completed a brief questionnaire[35] to aid qualification of issues within the group, including questions on how often students visited the library, the main purposes of their visits, the number of items they might borrow a month on average, and how many they purchase.

Coding of focus groups was found to be useful in spite of the restricted processing and analysis. A representative (fictional) statement is provided here as an example of the coding process:

> Student: I like to use the library for the Macs in the silent area. I use the design software, but I like how they are near the interior design books as it makes it easy to find stuff I need if I suddenly realise I'm missing something.

A comment of this nature would be tagged with library resource use with regards to technology and books, and ease of use/proximity. Had the student repeatedly referred to a specific issue, it would have been counted for each time it was raised to represent its importance to the speaker.

Results

Quantitative data
Statistical analysis demonstrated that at a cross-institutional level, there is a positive relationship between book borrowing and degree result, and electronic resource access and degree result, but not between library entries and degree result. Thus, the more a book or e-resource is utilised; the more likely a student is to have attained a higher level degree result. At an institutional level, where institutions were able to provide data, they demonstrated relationships in the same way. The example in Table 4 is taken from the combined data analysis of all institutions providing loan data, comparing borrowing levels between degree results.

Ranks				
Degree result		N	Mean Rank	Sum of Ranks
Total loans	First class	4207	3680.41	15483477.50
	Third class/Pass - ordinary	2417	2672.12	6458522.50
	Total	6624		

Test Statistics[b]	
	Total loans
Mann-Whitney U	3536369.500
Wilcoxon W	6458522.500
Z	-20.710
Asymp. Sig. (2-tailed)	.000

Monte Carlo Sig.	Sig.		.000^a
(2-tailed)	99% Confidence	Lower Bound	.000
	Interval	Upper Bound	.000
Monte Carlo Sig.	Sig.		.000^a
(1-tailed)	99% Confidence	Lower Bound	.000
	Interval	Upper Bound	.000

^aBased on 10000 sampled tables with starting seed 926214481.

^bGrouping Variable: Degree result

Table 4. Mann-Whitney U test analysing the difference in borrowing levels between first class and

third/"pass as ordinary" degrees

Table 4 indicates that the difference is highly significant, as the significance level is very close to zero, even in the use of the Monte Carlo calculation. The effect size is small to medium sized at -0.25 (a medium effect size is 0.3), indicating a drop in borrowing from first class to third class degrees. Some individual institutions additionally demonstrated small, specific relationships between library entries and degree result, particularly in one institution where, in three years of data, there were significant differences between first class degrees and ordinary or third class degrees, but no difference between upper level degrees overall. Most results showed effect sizes of small or medium levels (see Table 5). It should be noted here that a small effect size is still a significant result, indicating that there are differences between groups.

Institute	Athens/E-resource logins	Loans	Library entries
1		√	
2		√	X
3		√	
4	√	√	
5	√	√	√
6	√	√	X
7	√	√	√
8	√	√	√

Key: X - no relationship/minimal relationship

          √ - relationship

Where there is a gap in the table, no data was provided. One institute provided problematic data, leading to

it being excluded from analysis. It should also be noted that even though library entries often show

relationships in this table, differences only appear between two degrees or are very small in one analysis

only.

Table 5 Summary of data analysis results from all institutions

Qualitative data
When asked about what they felt led to a good degree result, a combination of personal qualities
and referral to resources overall were described, suggesting that students did realise that their use
of resources was linked to attainment, but indicating that they did not necessarily always
appreciate the varying quality of resources. Responses varied between institutions, but attendees
overall indicated that library resources were of great importance to them, regardless of what they
could obtain freely on the Internet. The library was regarded as a resource in itself, as a place in
which to not only find information but to utilise as a learning/technology space or as a way to meet
up with others on the course to discuss their coursework. Some identified the library as being a
space that impaired their learning, due to noise levels being too high or low, or preferring proximity
to home comforts. Many attendees discussed a formal process of finding the information they
required, regardless of the source of information, some with a systematic way of moving between
types of resource, and often seeking information away from reading list provision. Technical
issues of both access to information and general technology problems were frequently raised, and
students did refer to staff for technical and resource support.

Discussion

Data format
While the research has successfully demonstrated a statistically significant relationship between
library resource use and level of degree result, there are several issues that need to be
considered. Had data been available in a continuous format, something that was not available
from data resources at the time, a full analysis of correlation could have been conducted. The
nature of the data obtainable will depend on data protection laws, as well as regulations set out by
the institution: similar work conducted at the University of Wollongong[36] allowed them to access
average marks, but some of the LIDP project partners had problems obtaining full data sets due to
data retention and deletion policies at their institution. What data the project obtained required
extensive work on formatting it appropriately for analysis in SPSS, with the labelling of degree
results sometimes varying between partners depending on the student data software utilised.

Data reliability
The project partners are very aware that electronic resource data is increasingly problematic to
fully understand usage levels. Both borrowing books and logging onto electronic resources does
not guarantee the item has been read, understood and referenced. However, the issue is more
complex with electronic resources, as several clicks to different databases may only return a single
document, and heavy usage does not equate to high information seeking or academic skills.
Some courses embed information literacy skills into classes, leading to an initial spike in usage that
is not matched as studying progresses. Additionally, students on particular courses such as

history may be using more primary materials only available outside of library resources: non-use of library resources does not mean students are using poor quality information.

The amount of data used to prove a relationship is very large, and thus is more susceptible to demonstrating a relationship: data will be analysed in future to measure for relationships at a school or course level. Data of a smaller nature will allow for more collaboration with academics to direct student support and education more appropriately. While identifying a relationship is of great importance in both academic library use and in considering the importance of maintaining a public library service, identifying specific groups of high or low users of resources and their level of achievement will provide data which can be used more extensively to the benefit of library users.

One area where a statistical significance was not found was for library gate entry data. However, it does look like there is a difference between those students that were awarded a 1st and 3rd. This result was perhaps unsurprising. Students enter the library building for many reasons as they will commonly contain group study facilities, lecture theatres, cafes and social spaces and student services, therefore a student is just as likely to be entering the building for these reasons which may or may not have an influence on final grade.

Qualitative data
With regards to qualitative data, time constraints meant that the method is simplistic, and inevitably raises issues with compartmentalising data into generalised labels and converting it into numeric data. However, it is still of use to gauge what might be considered of particular importance to students at the time of the group meeting. Group attendees are more likely to be 'good' students, those who are interested in engaging with library staff, while those who are poor users are less likely to be motivated to attend meetings regardless of the offer of compensation. Groups may not be representative of the variety of courses offered, and some voices may be louder than others, thus skewing the responses.

Conclusion and further research

Project aims and objectives
The Library Impact Data Project had a relatively straightforward aim, but a very short timescale in which to achieve it. One risk to the whole project was in getting eight universities to work to a common goal in a short space of time, the overall success of the project was very much down to the contributions of all the partners who made every deadline and in many cases provided additional information over and above the project's specification.

The project's hypothesis was:

Is there is a statistically significant correlation across a number of universities between library activity data and student attainment?

As previously discussed, the project cannot support a correlation due to non-continuous data for degree results. However, the project has successfully demonstrated that there is a statistically significant relationship between student attainment and two of the indicators, e-resources use and book borrowing statistics, and that this relationship has been shown to be true across all eight partners in the project that provided data for these indicators. It is true to say that in some cases there is less significance than in others, but one of the overall aims of the project, which was to test whether the original Huddersfield data was an anomaly, has been fully achieved.

It is critical at this stage to reiterate that the results and any conclusions drawn from the project are not indicators that library usage and student attainment is a causal relationship. The project is keen to note that other factors will have an influence on students' achievements.

Project outputs

Huddersfield composed several reports for each partner including a complete set of data and analysis of their own data. After consultation with the partners the release of an anonymised set of data has been agreed. This data has now been released under an Open Data licence[37]. The data has been made available in Excel, comma separated and plain text and contains final grade and library usage figures for 33,074 students studying undergraduate degrees at the eight partner universities. In order to ensure complete anonymity for the partners they are listed as LIB1 to LIB8. The names of the schools and/or departments at each university have been replaced by randomly generated IDs and some courses have been 'generalised' to remove elements that may identify the institution. Table 6 shows further information from the data.

Grades

The awarded degree has been mapped to the following code:

- A = first (1)

- B = upper second (2:1)

- C = lower second (2:2)

- D = third (3)

- E = pass without honours

Library Usage

Where supplied by the project partner, the following library usage data measures are included:

- ISSUES = total number of items borrowed from the library by that student (n.b. this may include renewals)

- ERES = a measure of e-resource/database usage, e.g. total number of logins to MetaLib or Athens by that student

- VISITS = total number of times that student visited the library

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Other Notes

each graduate has been allocated an randomly generated unique ID

- Where the course/school/department name was not supplied, it has been replaced with N/A

- Where the measure of library usage was not supplied by the partner, the value is blank/empty

Table 6: Notes from the data release

A further output from the project was a toolkit[38], which provides instructions for libraries to extract their own data and benchmark it against the anonymised project data described above. The toolkit discusses the extraction of the data and gives tips for statistical analysis and suggestions for further investigation.

Data has already proven useful in library teaching for one partner institution, where LIDP data has been used to engage student interest in inductions, pointing out that their use of library resources will impact on their final result and directing them to quality materials to curb use of poor quality non-library resources. Huddersfield is also using the data in a poster campaign.

Lessons learned
A major issue for one of the partners was the retention of data within the University. It is vital for any project that wishes to use data for these purposes to include forward planning for the retention of data. In order to achieve this, all internal systems and departments need to communicate with each other. Data should never be deleted without first checking the implications of doing this on other departments within the university. Partners found that this was often based on arbitrary decisions rather than university policy.

When examining e-resources usage data, the project has always noted that the way this data is collected may be questionable, however, it is the only comparable data that can be collected and traced back to an individual. Although data from COUNTER reports is far more reliable, there is no way that this data can be attributed to an individual. Different institutions collect different data in this respect, e.g. EZProxy, Shibboleth or Athens logins, however many institutions do not collect this data at all.

The project found that it underestimated the time taken to analyse the data; collection and analysis of the data took up four months of the six month project. It is recommended that institutions take this into account before initiating this process internally.

Finally it should be noted that project data was managed according to English law and that institutions in other countries need to make their own considerations in their data extraction/analysis.

Further research
In November 2011 the University of Huddersfield was approached by JISC to submit a proposal for an extension to the original project. In December 2011 funding was approved to take this forward into phase II of the project. The aim of phase II will be to look at additional data such as gender, age, ethnicity and country of origin in order to enrich the quality of data and identify some possible causal links. It is hoped that this data could also provide better management information to show the value added impact of libraries, university entry points and final percentage mark, rather than grade, will be used to measure this. Phase II will also use some of the additional data described above to hold a number of case studies in order to better understand student behaviour.

Given the extent to which the findings from LIDP can influence teaching, staffing time and resource selection, academic libraries can only continue to demonstrate and improve on their value for students and academics alike.

Acknowledgements
The Library Impact Data Project would like to thank JISC for the project funding, in particular Andy McGregor for his support as Programme Manager. Special thanks go to Dave Pattern at the University of Huddersfield for his work on the original concept. The success of the project is down

References

1. HM Treasury, *Spending review 2010*. CM 7942 (London: The Stationery Office, 2010), available online at http://cdn.hm-treasury.gov.uk/sr2010_completereport.pdf [accessed 10 June 2012].

2. Lord Browne of Madingley, *Securing a sustainable future for higher education: an independent review of higher education funding & student finance* (Independent Report, 2010), available online at http://hereview.independent.gov.uk/hereview/ [accessed 10 June, 2012].

3. James G. Neal, "Stop the madness: the insanity of ROI and the need for new qualitative measures of academic library success", in *Proceedings of the ACRL 2011 Conference, a declaration of interdependence, Philadelphia, 30 March – 2 April* (2011) available at https://www.ala.org/ala/mgrps/divs/acrl/conferences/confsandpreconfs/national/2011/paper s/stop_the_madness.pdf [accessed 10 June 2012].

4. Patrick Barkey, "Patterns of student use of a college library", *College and Research Libraries,* 20, no.2 (1965): 115-118.

5. J. Lubans, "Nonuse of an academic library", *College and Research Libraries,* 32, no.5 (1971): 362-367.

6. Peter H. Mann, *Students and books.* (London, Routledge and Keegan Paul, 1974).

7. Patricia B. Knapp, *Monteith College Library Experiment.* (New York, Scarecrow Press, 1966)

8. Ontario Library Association, *School libraries and student achievement in Ontario.* (Ontario, Ontario Library Association, 2006) available online at http://www.peopleforeducation.com/school-libraries/2006 [accessed 10 June 2012].

9. Lesley S. J. Farmer, "Library media program implementation and student achievement", *Journal of Librarianship and Information Science*, 38, no.1 (2006): 21-32. doi: 10.1177/0961000606060957

10. Valeda.F. Dent, "Observations of school library impact at two rural Ugandan schools", *New Library World*, 107, no.9/10 (2006): 403-421. doi: 10.1108/03074800610702598

11. Carol Tenopir, "The Value Gap", *Library Journal,* 134, no.12 (2009): 20

12. Carol Tenopir, Don W. King, Regina Mays, Lei Wu and Andrea Baer, "Measuring value and return on investment of academic libraries", *Serials,* 23, no.3 (2010): 182-190. doi: 10.1629/23182

13. Judy Luther, *University investment in the library: What's the return? A case study at the University of Illinois at Urbana-Champaign,* (London, Elsevier, 2008) available online at http://libraryconnect.elsevier.com/whitepapers/0108/lcwp0101.pdf [accessed 10 June 2012].

14.   Carol Tenopir and Rachel Volentine *UK Scholarly Reading and the Value of Library Resources: Summary Results of the Study Conducted Spring 2011*, (Knoxville, University of Tennessee Center for Information and Communication Studies, 2012) available online at http://www.jisc-collections.ac.uk/Reports/ukscholarlyreadingreport/ [accessed 10 June 2012].

15.   Karin De Jager, "Impacts and outcomes: searching for the most elusive indicators of academic library performance", in *Meaningful Measures for Emerging Realities, proceedings of the 4th Northumbria International Conference on Performance Measurement in Libraries and Information Services*, (Washington, DC, Association of Research Libraries 2002), pp. 291-297.

16.   Karin De Jager, "Successful students: does the library make a difference?" *Performance Measurement and Metrics* 3, no.3 (2002): 140-144. doi: 10.1108/14678040210453564

17.   Shun Han, Rebekah Wong and T.D. Webb, "Uncovering meaningful correlation between student academic performance and library material usage", *College and Research Libraries*, 72, no.4 (2011): 361-370.

18.   Mark Emmons and Frances C. Wilkinson. "The Academic Library Impact On Student Persistence", *College & Research Libraries*, 72, no..2 (2011): 128-149.

19.   Sue White and Graham Stone, "Maximising use of library resources at the University of Huddersfield", *Serials,* 23, no.2 (2010): 83-90. doi: 10.1629/2383

20.   Deborah Goodall and David Pattern, "Academic library non/low use and undergraduate student achievement: a preliminary report of research in progress", *Library Management,* 32, no.3 (2011): 159-170.

21.   David Pattern, "Non/low library usage and final grades", *Self-plagiarism is style blog* (2010) available online at http://www.daveyp.com/blog/archives/1385 [accessed 10 June 2012].

22.   Margie H. Jantti and Brian Cox, "Measuring the value of library resources and student academic performance through relational datasets", in *Proceedings of the Library Assessment Conference: Building Effective, Sustainable, Practical Assessment, Balitimore, Maryland, 25-27 October 2010* available online at http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1120&context=asdpapers [accessed 10 June 2012].

23.   Brian Cox and Margie H. Jantti, "Capturing business intelligence required for targeted marketing, demonstrating value, and driving process improvement", Library and information science research, vol.34, no.4 (2012): 308-316. doi: http://dx.doi.org/10.1016/j.lisr.2012.06.002

24.   Association of College and Research Libraries, *Value of Academic Libraries: A Comprehensive Research Review and Report*. Researched by Megan Oakleaf. (Chicago: Association of College and Research Libraries, 2010) available online at http://www.ala.org/ala/mgrps/divs/acrl/issues/value/val_report.pdf [accessed 10 June 2012].

25.   Ibid. p23

26.   "SCONUL Statistical Questionnaire — Performance Portal", (2012) available online at http://vamp.diglib.shrivenham.cranfield.ac.uk/statistics/sconul-statistical-questionnaire [accessed 10 June 2012].

27.   Laurie M. Bridges, "Who is not using the library? A comparison of undergraduate academic disciplines and library use", *Portal: Libraries and the Academy*, 8, no.2 (2008): 187-196. doi: 10.1353/pla.2008.0023

28.   Sue White and Graham Stone, "Maximising use of library resources at the University of Huddersfield", in *UKSG 33rd Annual Conference and Exhibition, 12-14 April 2010, Edinburgh International Conference Centre* available online at http://eprints.hud.ac.uk/7248/ [accessed 10 June 2012].

29.   ibid.

30.   "JISC Activity Data", (2011) available online at http://www.jisc.ac.uk/whatwedo/programmes/inf11/activitydata.aspx [accessed 10 June 2012].

31.   "Library Impact Data Project final blog post", (2011) available online at http://library.hud.ac.uk/blogs/projects/lidp/2011/07/21/the-final-blog-post/ [accessed 10 June 2012].

32.   "Transcript - Postgraduate Study, US-UK Fulbright Commission: How do I convert a UK result to a US GPA?" available online at http://www.fulbright.org.uk/study-in-the-usa/postgraduate-study/applying/transcript#how%20do%20i%20convert [accessed 15 August 2012].

33.   Andy P. Field. *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll*. 3rd ed. (London, Sage, 2009).

34.   "Library Impact Data Project Toolkit", (2011), p.13, available online at http://eprints.hud.ac.uk/11571/ [accessed 10 June 2012].

35.   Ibid., 14

36.   Jantti and Cox, "Capturing Business Intelligence required for targeted marketing, demonstrating value, and driving process improvements".

37.   "Library Impact Data Project dataset" available online at http://eprints.hud.ac.uk/11543/ [accessed 10 June 2012].

38.   "Library Impact Data Project Toolkit"