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Library Impact Data Project Toolkit: Phase 2

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Library Impact Data Project Toolkit: Phase 2



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Library Impact Data Project Toolkit

The second phase of the Library Impact Data Project set out to explore a number of relationships between undergraduate library usage, attainment and demographic factors. There were six main work packages:

1. Demographic factors and library usage: testing to see whether there is a relationship between demographic variables (gender, ethnicity, disability, discipline etc.) and all measures of library usage;
2. Retention vs non-retention: testing to see whether there is a relationship between patterns of library usage and retention;
3. Value added: using UCAS entry data and library usage data to establish whether use of library services has improved outcomes for students;
4. VLE usage and outcome: testing to see whether there is a relationship between VLE usage and outcome (subject to data availability);
5. MyReading and Lemon Tree: planning tests to see whether participation in these social media library services had a relationship with library usage;
6. Predicting final grade: using demographic and library usage data to try and build a model for predicting a student's final grade.

Data were not available for work package 4, but should this data become available it can be tested in the same way as in the first phase of the project, or in the same way as the correlations outlined below. Work package 6 was also a challenge in terms of data, and we made some progress but not enough to present full results. We are in a similar position in terms of value add to where we were in the first phase of the project in relation to library usage and outcomes – we believe we have observed a correlation but we are not able to say that it is statistically significant.

We were also able to complete an additional work package, which offered us a new way of testing the relationship between final outcome (as a percentage grade rather than a class) and library usage. The technique for this is outlined below.

This toolkit explains how we reached our conclusions in work packages 1, 2 and 6 (the conclusions themselves are outlined on the project blog: <http://library.hud.ac.uk/blogs/projects/lidp/>). The aim is to help other universities replicate our findings.

One of the outcomes of the project was to provide a toolkit to assist other institutions who may want to test their own data against this hypothesis. The toolkit aims to give general guidelines about:

1. Data Requirements
2. Legal Issues
3. Analysis of the Data
4. Focus Groups
5. Suggestions for Further Analysis
6. Release of the Data

This toolkit builds on the Phase 1 Toolkit available at: <http://eprints.hud.ac.uk/11571/>

LIDP data has been made available under the Open Data Commons Attribution License <http://opendatacommons.org/licenses/by/1.0/>. If you have used this toolkit to look at your data, we ask you to share your data too. Please let us know and we will link to it from the project blog.

1. Data Requirements

The data required for the second phase of the project is quite complex, but some analysis is certainly possible even if you cannot get hold of all the information that we had. The following table outlines the data that we used.

Variable group	Variable name	Detail/notes
Library use variables Ideally, you want this data separately for each academic year – or even term, if you can get it – but if you cannot achieve this then the total is usually fine.	Number of items borrowed	
	Number of library visits	Measured via gate entries
	Hours logged into library PC	<p>1 PC hour means that the student was logged into a library PC during a given hour of a given day. For example, if a student logged in at 9:40am and logged out at 11.20am, that would be 3 PC hours (9am, 10am and 11am).</p> <p>We did not count multiple log-ins within the same hour and on the same day: if a student logs in at 9.10am, logs out at 9.15am and then logs back in at 9.40am, that would still just be one login for the hour of 9am.</p> <p>But (just to be completely clear) if a student logged in at 9.15am on one day, and then 9.30am the next day, we would count that as 2 PC hours, as the logins were on different days.</p> <p>The maximum possible number of PC hours per year is 8,760 (24 hours times 365 days).</p>
	Hours logged into library PC, per hour	<p>This is exactly the same data as above, except broken down by hour. So we count all the times that a student logged into a library PC between 9 and 10am over the course of a year, then all the times they logged in between 10 and 11am – and so forth.</p> <p>Again, we exclude multiple log-ins within the same hour on the same day.</p>
	Hours logged into e-resources	<p>1 e-resource hour means that the student used e-resources at some point during a given hour of a given day. Multiple uses within the same hour are only counted once, but uses in the same hour on different days are counted separately.</p> <p>Again, the maximum possible number of e-resource logins per year is 8,760 (24 hours times 365 days).</p>
Hours logged into e-resources, by hour	Again, the same data as above, but broken down by hour.	
	Number of PDF downloads	

	Number of e-resources accessed	The number of different e-resources – ranging from individual journals subscriptions to large journal platforms – that a student has accessed. Our data here is completely shaped by how Huddersfield’s e-resource accesses are managed, so your data is likely to be different.
	Number of e-resources accessed 5 or more times	
	Number of e-resources accessed 25 or more times	
Demographic variables We got data for these variables directly from the Huddersfield student management system. Your system may classify students in a different way: that is not a problem.	Ethnicity	The way that this is coded will depend upon your institution’s systems, and you might want to work with colleagues to consider the best way to aggregate it.
	Age on entry	As a number if possible, but if your data only allows you to distinguish between mature and non-mature students that’s fine too. If you only have their current age, you will need to calculate their age on entry.
	Gender	
	Disability	Again, the way that this is coded will depend upon your institution’s systems, and you might want to work with colleagues to consider the best way to aggregate it.
	Country of domicile	This is Huddersfield’s way of expressing where a student lives when they are not studying at the university. Your system may have nationality instead – it’s not exactly the same thing but it is fine to use it as a replacement.
University information	Course name	
	School / department	We did not have this data: if you have it, it may save you from having to do reclassifications based upon the ‘course name’ variable (above)
	Year of study	
	Year of graduation	Where applicable!
	Course type	Undergraduate, Masters etc.
	Attendance mode	Part-time, full-time etc: for certain tests you must also be able to distinguish between current students and those who have dropped out.
	Location	Huddersfield had three separate campuses in different towns at the time the data was analysed, something which is likely to affect library usage: if all your students are based in the same town/campus this data may not be necessary.
	Final degree mark	Final degree mark as a percentage
Final degree class	First, 2.i, 2.ii, Third and Fail/Unclassified	

If the data comes from a number of different systems, you will need to be able to link data from different systems to the individual students.

Notes

- As per the UK Data Protection Act, the extract should not include information that identifies, or could be used to identify, a named individual (e.g. their name or a campus network ID).
- Ideally, the data extract should be in an Excel-readable format, to aid preparation and ease of transfer to SPSS/PASW for analysis.

Once data has been successfully extracted, it will need to be recoded and prepared for use in the analytical software (see sections on recoding variables and SPSS/PASW).

2. Legal Issues

One of the big issues for the project was to ensure we were adhering to legal regulations and restrictions, and continue to do so. You should ensure you discuss privacy issues with your institute's legal advisor, records manager and/or ethics committee. As detailed earlier we made efforts to ensure there is:

- full anonymisation of both students and universities so that neither can be identified via the data. We contacted JISC Legal prior to data collection to confirm our procedures were appropriate, and additionally liaised with our Records Manager and the University's legal advisor.
- **We have excluded any small courses in public reports or open access release to prevent identification of individuals i.e. where a course has less than 35 students and/or fewer than 5 of a specific degree level.**
- We referred to another data project, EDINA, which provides the following statement for collaborators to use on their webpages:

"When you search for and/or access bibliographic resources such as journal articles, your request may be routed through the UK OpenURL Router Service (openurl.ac.uk), which is administered by EDINA at the University of Edinburgh. The Router service captures and anonymises activity data which are then included in an aggregation of data about use of bibliographic resources throughout UK Higher Education (UK HE). The aggregation is used as the basis of services for users in UK HE and is made available to the public so that others may use it as the basis of services. The aggregation contains no information that could identify you as an individual."

http://edina.ac.uk/projects/docs/Appendix_D_How_to_inform_your_users_about_data_processing.pdf

Focus groups have also been conducted with a briefing and a consent form to ensure participants are fully aware of data use from the group and of their anonymisation and advising them that they can leave the group at any point (see section on focus group guidelines).

3. Recoding variables

Some of the student data that you have extracted from your various university systems will need to be recoded before you can use it for analysis.

Demographics and subjects

In order to do our statistical tests for the demographic and subject-related variables, we need to minimise the number of categories we are putting the data into, or it will be very difficult to identify statistically significant differences. For the same reason, we need to make sure that there are a decent number of students in each group – and, as outlined in section 2, this is also important to protect student confidentiality. All that said, it is very important not to group data simply in order to get statistically significant results. Your groupings have to make sense from a theoretical point of view as well, or your conclusions will be meaningless. There's more about this on the project blog.

We recoded the following variables:

Ethnicity	<p>The original data offered us no less than 20 different ethnic groups, some of which had fewer than five members. So we regrouped them into six main categories, plus those who had refused to give an answer to the question. The categories were:</p> <ul style="list-style-type: none">• Asian• White• Black• Mixed• Chinese• Other
Disability	<p>Again, there were too many categories in the original data to allow effective analysis. We regrouped them:</p> <ul style="list-style-type: none">• No disability• Learning difficulty (including dyslexia and autism)• Other disability (including physical and mental disabilities)
Age	<p>We categorised everybody as either a mature student (21 or over when beginning their degree), or not a mature student.</p>
Country of domicile	<p>Again, more countries than we could use, many with just one or two students. We recategorised:</p> <ul style="list-style-type: none">• UK• New EU (countries who joined from 2004 onwards)• Old EU (countries which were members before 2004)• China• Rest of world
Discipline	<p>There are over a hundred courses, which were far too many for us to categorise. We regrouped them into 'clusters' of between 2 and 22 courses, and then put the clusters into 'groups' of between 1 and 5 clusters:</p> <ul style="list-style-type: none">• Science (Science)• Health (Nursing; Health)• Computing and engineering (Computing; Engineering)• Arts (Music; Architecture; Fashion; 2D Design; 3D

	Design) <ul style="list-style-type: none"> • Humanities (English; Drama; Media & Journalism) • Social Sciences (Business; Law; Behavioural Sciences; Social Work; Education)
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Usage data

The only recoding that we did for the usage data was to find the percentage of usage of e-resources which occurred overnight. This was done by combining the total e-resource usage per year, and the e-resource usage per hour for the same year (in our case, 2010-11).

First, we added together the usage data for a single year for all the hours between 9pm and 9am. Then, we divided this sum by the total usage for that year. This gives us the percentage of a student's use which occurs overnight.

We did not do the same for the PC data because the library is not open 24 hours a day for the entire year. However, if you do have 24 hour access for a whole year, you could do the same thing to see whether overnight library PC usage has a relationship with student outcomes.

4. SPSS/PASW Analysis of Data

Preparation of data

SPSS/PASW is the software programme we used to analyse our findings. It is a very powerful programme, but it has some limitations. It deals best with data that is numerical, not text-based. This means that you will probably need to recode all your categorical variables (such as the demographic data, subject information, degree class, mode of study etc.). You may find it easiest to do this in Excel using lookup tables.

Analysis process

The choice of test is very dependent upon the data that you have. The sections below outline the various tests that we used for our analysis. In short, if you have two continuous variables you would use the second set of tests, and if you have at least one categorical variable, you would use the first set of tests.

- A **categorical** variable is one made up of categories, where you cannot be in more than one category at the same time, or be between categories. An example from this study is country of domicile: you cannot have your main residence in more than one place (much as MPs might want you to believe to the contrary!).
- A **continuous** variable is on a numerical scale where it makes sense to have a measurement at any point on the scale. An example from this study would be final grade as a percentage: you can measure this to an infinite number of decimal places and it would still make sense (although why you would want to is another question...).

Generally it's quite easy to identify whether your variables are continuous or categorical, but it can be tricky with a small number of numerical variables that are not continuous. For example, think about a rating scale for a set of classes. You might set it up so people can only give whole numbers as their score, but it would still make sense to talk about a score of '2.58'. This is a continuous variable. But think about places in a horse race. Again, it's set up so you can only come first, second, third etc. but in this instance it doesn't make sense to talk about coming in '2.58th place'. You cannot be between categories, so this variable is categorical, even though it's numerical.

Demographic, retention and grade variables as they relate to usage

In all these cases, our dependent, or outcome, variables were the usage measures that we had collected. This data is continuous, which makes it possible to run a wide range of statistical tests. But many of these tests require that the data be normally distributed. To an extent, this can be checked by sight, as the normal distribution follows the famous 'bell curve' shape, showing a peak at the centre. It was very obvious that our usage data was not normally distributed, as the peak was actually around very low levels of usage (in some cases, zero!) and obviously you cannot have negative usage, which means the observed peak could not be the centre of a bell curve. But to be sure, we ran the [Kolmogorov-Smirnov test](#) for normality, showing that none of our data was normally distributed.

Once we know that the dependent variable is not normally distributed, we have to use a set of tests called 'non-parametric tests', which work with non-normal data. The particular non-parametric tests outlined below are used for analysis where the dependent variable is continuous and the independent variables (in this case, demographic characteristics, retention and grade as a class) are categorical. The following section explains our method when both variables were continuous. Our analysis was done in several stages.

1. The [Kruskal-Wallis \(KW\) test](#), which is used when the variable has more than two categories (if you only have two categories – e.g. male and female – move directly to the Mann-Whitney test, below). This test allows you to determine whether there is a difference between the various categories within your independent variable, but it will not tell you where the difference lies.

If the result from this test indicates that there are statistically significant differences between the categories ($p < .05$), you need to move onto the next stage to try and find out which ones are different from each other. If not, you can retain the null hypothesis – that usage is the same across all categories – and move on.

2. The next stage is a bit more complicated. To find out the differences between the groups, we move on to the [Mann-Whitney \(MW\) test](#), which determines whether there is a difference between two categories within a variable.

Now, you could just test the difference between all the categories, pair by pair. But this increases the likelihood of a Type 1 error – in other words, you identify a difference where in fact none exists.

You can limit this problem by applying a Bonferroni correction to your Mann-Whitney tests. To do this, you simply divide the critical value (p – the level of statistical significance you are seeking, which is usually .05) by the number of tests that you are running.

This sounds fine, but if you run a lot of tests you will end up using a critical value that is very small, and therefore restrictive. So you need to choose your tests carefully, ensuring that you are only looking at comparisons that you really want to make.

For lots of our comparisons we used a 'control' group to test all the others against. In most cases, this was the category with the most members in it. All groups were tested against the control, allowing us to identify differences between the majority group and minority ones (but not between the different minority ones). It is important to make this clear when

presenting the findings.

3. Finally, we calculated the effect sizes for the Mann-Whitney tests that showed statistical significance. This is very simple: divide the Z score from the test by the square root of the sample size for that test. Effect sizes were classified according to Cohen:

- .1 is a small effect
- .3 is a medium effect
- .5 is a large effect

Usage as it relates to grade as a percentage and UCAS points on entry

For these tests, both our variables were continuous, which opens up a much wider range of options, including tests of correlation. As before, we had to begin by establishing whether the variables were normally distributed or not. In this case, the final grade data was normally distributed, but the other two were not. Again, this puts us in the realm of the non-parametric test, but this time we can use [Spearman's correlation coefficient](#) (also known as Spearman's rho). This is a test of correlation, and allows us to understand the relationship between two variables, where a result of 0 would indicate no correlation whatsoever, 1 would indicate perfect positive correlation (as x increases, so does y) and -1 would indicate perfect negative correlation (as x increases, y decreases).

Spearman's correlation coefficient is relatively straightforward in SPSS: you simply choose your two variables and run the test. The output will give a correlation coefficient, *r*, which tells you how strong the correlation is. You will also get a *p* value which tells you whether the result is statistically significant (significance is usually measured at the .05 or .01 levels – you need to state which level you are using when reporting your findings).

We referred to the following text to guide our use of SPSS, and strongly recommend that you do likewise!

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

5. Focus groups

Purpose

The aim of these workshops is to work with groups of students who have lower-than-usual use of library services (identified through the data analysis), and to explore some of the reasons for that low use. We have tried to design the workshops to be fairly active and to produce plenty of written outcomes to minimise the amount of writing-up that will need to happen after the workshop.

Before the workshop

You will need to do a bit of preparation before the workshop.

First, you need to know how many people will be attending the workshop. You'll be splitting them into groups of 2-4 people, and will need to create the following set of tools for each group.

1. Large sheet of paper – at least the size of a flip-chart – on which you will need to draw a horizontal scale (or a straight line with arrows at each end!). Label one end of the scale 'don't use', and the other end 'use lots'.
2. Some additional pieces of flip-chart sized paper – you do not need to write anything on these.
3. Post it notes, in two different colours. One colour is for the participants to use, and the other colour is for you. On your post it notes, you need to write down a whole load of information sources that you think students could be using for their assignments. These should include search tools, discovery mechanisms including lecturer recommendations and reading lists, formats (print, electronic, web-based), types of information such as books, journal articles, databases. You can be as specific as you like. If the workshop is based around a discipline, you might want to include discipline-specific tools/resources, or check with a tutor beforehand to see whether they've recommended anything. You might also want to include things such as the reference desk within the library, and you might want to include things like Google as well. You should aim to come up with between 15-30 things. As you will be creating this for each group, it might be easier to print them out on coloured paper and use blu-tak rather than post-it notes – if you do this, make sure you bring some spare bits of paper in the 'staff' colour to the workshop with you.
4. For the workshop itself, you will need these items, plus some blu-tak and fine-line marker pens – these last are only important if you want to take photographs of the final outputs; you can just get students to use biros if not!

The workshop plan

This workshop will take 90 minutes to run. Before it starts, make sure the room is set up as you want it, and that everything is ready to go, as it's a tight schedule and you do not want to lose time in admin at the start! Write a very short version of this plan (just the times and activities) on a piece of flip chart paper and stick it up on the wall where participants can see it.

Before running each activity, make sure you are clear about what you are asking them to do, and try to set it up as briefly as possible. Before you set them off, ask them whether your explanation was clear, and check whether they need any further information.

When they are doing the activities, I would suggest you give them up to five minutes to settle into it, and then go round the groups listening in to their discussions. If you can see that they are struggling to get into the task, ask them a question or two as prompts to get them started. But try not to direct the discussions too much, especially in the first part of the first exercise, which should come from them. This is also a chance for you to think about some of the questions that you might use to start the final discussion session, based on what they are talking about.

Students were asked to volunteer via email, advertising a small reimbursement for their time, which may include shopping gift vouchers or print/photocopying credits. Success in response rate and attendance will vary according to the term schedule and the size of the reimbursement, so it is advised to plan group sizes accordingly: assume that 50% of those asked will attend the group but make plans for 100%! The length of the session should be detailed in the email, and scheduled so that participants can easily fit it into their timetables and leave early if required. An hour with

forthcoming students can create a substantial amount of data (on average around 15-20 sides of transcription).

Focus groups should be conducted following any ethical requirements of your institution, but should be sympathetic to the anonymity of participants throughout the recruiting, recording, transcribing and data reporting processes. Ensure attendees are clearly informed about the purpose of the group and data collection, and give them the option to leave the group and have their answers deleted at any point during, or following the group meeting. Attendees should also be provided with an information sheet detailing again the purpose of the group, with contact information for those leading the research and for at least one other member of staff so that any complaints or sensitive issues can be raised freely outside of the focus group. See Appendix 1.

Coding focus group transcripts

The coding process will depend entirely on the nature of the discussion within each group, and it is advisable to create codes and theme classification during several readings of the full set of data gathered. LIDP used a process of making notes of potential themes arising: the process creates a sometimes lengthy list of broad themes with satellite elements of more descriptive themes which can then be designated a code word. The code, or multiple codes are attached where appropriate within the transcript, for example the following statement covers a large number of themes:

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.

The statement can be tagged with codes relating to technology use, but also to accessing library books, ease of use and/or proximity requirements. If a student repeatedly discusses a particular code several times in separate statements, it may be counted for each of those times. If time allows, further readings can be made to elaborate on the coding e.g. to draw out underlying implications from the statement (in the statement above, codes could be used to elaborate on speed of access and convenience, as well as questioning whether the silent area is chosen for proximity alone or also related to silent studying).

Once statements are coded, they can be totalled up to discover indicators of importance to the participants, and analysed to find connections. Frequent combinations, such as those of electronic resource use and technical problems or staff support could, while not necessarily directly discussed, indicate underlying issues, in this case computing issues, a gap in information literacy teaching, or even problems with subscriptions. Issues arising in this way could be confirmed with participants if they agreed to being contacted again, or create a point of further research and discussion at a later date.

Appendix 1

JISC Library Impact Data Project

Focus Group Consent Form

I have been fully informed of the nature and aims of this research and consent to taking part in it.

I understand that I have the right to withdraw from the research at any time without giving any reason, and a right to withdraw my data if I wish.

I understand that the focus group will be recorded for transcription purposes.

I give permission to be quoted (by use of pseudonym).

I understand that the tape will be kept in secure conditions at the University of Huddersfield.

I understand that my identity will be protected by the use of pseudonym in the research report and that no information that could lead to my being identified will be included in any report or publication resulting from this research.

I understand that someone other than the researcher may transcribe my interview and that data will be analysed at a central location at the University of Huddersfield.

I understand that I can request a copy of the interview transcript and that the researcher will check that I still consent to data being used from the transcript.

Name of participant

.....

Signature

.....

Date

.....

Name of researcher

.....

Signature

.....

Date

.....

Two copies of this consent form should be completed: One copy to be retained by the participant and one copy to be retained by the researcher

Focus Group Participant Information Sheet

1) Research project title and purpose

The project is called the Library Impact Data Project (LIDP), and is funded by jisc. This is the second phase of the research – the first was part of jisc’s Activity Data strand of projects. More information about jisc and the Activity Data projects can be found here:

<http://www.jisc.ac.uk/whatwedo/programmes/inf11/activitydata.aspx>

LIDP aims to examine the link between library resource usage and final degree results. The first phase found a link across 8 different universities to say the borrowing of books and use of electronic resources impacted on final degree result. Now we want to focus Huddersfield student use in more detail. The results could make a big difference for the quality of services and facilities we offer students, and we can focus on why some courses have very high or very low usage of the library facilities and work to improve our provisions accordingly.

2) Why have I been asked to take part?

You are part of a representative sample across the university’s undergraduate and postgraduate students studying at the participating institutions involved in the project.

3) Do I have to take part?

No. If you decide to take part and then change your mind, you can leave at any point.

4) What do I have to do?

You will be asked to answer a few questions about how you do or don’t use library facilities and resources, such as databases and books. The focus group may take up to a maximum of 90 minutes.

Please try to be as honest as possible. The research aims to find out why you chose to use or ignore various library provisions, and is not meant to be critical of your personal use in any way.

5) What are the possible disadvantages/benefits of taking part?

The only disadvantage should be sacrificing your time when you participate. The researchers will compensate you for your time with Amazon vouchers (or similar, specified by the project).

6) What if something goes wrong?

If you wish to make a complaint about anything you experience throughout your involvement in the project or following results dissemination, contact the project manager Graham Stone (g.stone@hud.ac.uk).

7) Will my data be kept confidential?

Yes – any information you provide will be kept as confidential, and anonymised so that you cannot be identified in any reports or publications. You may find you are provided with a sticker to wear at the group which identifies you as ‘student A’: the researcher will use this to connect the comments to each individual without jeopardising anonymity.

8) Why do you need my participation?

We would like your opinions and information on how/why you use the library to help us find out why particular courses or groups of people do or don’t use the library and its resources. Any patterns we find will help us to revise services, target poor usage courses and check our subscriptions to journals and databases to ensure we provide what you need for your studying. The project may also help other universities not involved project modify and adapt their own services.

9) What will happen to the results of the research?

The results will be disseminated via the project blog: <http://library.hud.ac.uk/blogs/projects/lidp/>
You will not be identifiable via the results published.

10) Will I be recorded? How will the recording be used?

You may be recorded for the purposes of keeping track of the group discussion, as notes made by the researchers may not be sufficient data alone: the recording will be transcribed for analysis so that any comments you make can be used within appropriate context and will not misrepresent your library use, but you will not be identified by name (you may be referred to as, for example, student A). The recordings will not be used outside of this process without your written consent, and will not be made available to anyone outside of the project.

11) Contacts for further information

If you require further information, email the project manager, Graham Stone [g.stone@hud.ac.uk]

Thank you for your time and participation in this research.