Library usage and demographic characteristics of undergraduate students in a UK university

Introduction

In 2011, the Library Impact Data Project presented its initial findings to the 9th Northumbria international conference on performance measurement in libraries and information services (Stone *et al.*, 2012). This work demonstrated that there is a statistically significant relationship across a number of universities between library activity data and student attainment. Since then the project has received further funding from Jisc to dig deeper into the data. This paper investigates the hypothesis that there is a relationship between demographic characteristics - e.g. age, gender and ethnicity – and undergraduates' (1) use of academic libraries. The paper will outline the methodology of the research and present findings that show that there is a statistically significant difference, although in some cases very small, between age groups, gender, ethnicity and country of origin. The paper concludes with a discussion of the findings and recommendations for further study, including focus groups with low/non users in order to find possible causes for the relationship that we have identified.

Literature review

Recent literature reviews looking into library usage and undergraduate attainment have found little evidence of research until the last few years (Cox and Jantti, 2012, Stone and Ramsden, 2012). Stone and Ramsden reported that much of the current research has been around school library resources (Farmer, 2006, Ontario Library Association, 2006). There have been a number of recent studies looking at academic library value and researchers (Auckland, 2012, Oakleaf, 2010). These studies have tended to look at the 'bigger picture' and have not attempted to look at possible relationships between usage and demographic characteristics.

Exploring and quantifying the social impact of libraries, the 'value for the individual' as Poll and Payne describe it (2006, p.554) is a complex challenge, and usually involves segmenting users and potential users in various ways, including using demographic characteristics. The question is usually investigated using techniques such as interviews, surveys and focus groups, all of which allow the researcher to establish the sociodemographic characteristics of the participants. Projects such as this have often been carried out in the public library sector and have looked at topics such as social inclusion and use of services by certain groups in the community (Bohme and Siller, 1999, Debono, 2002, Linly and Usherwood, 1998, Suaiden, 2003). However, in a review of the literature on use and non-use of public libraries, Sin and Kim (2008) state that, '[w]hilst research on public library use/non-use has expanded in the past decades, the relationship between different variables and public library use/non-use still appears inconclusive. In addition to the dearth of study testing the supply-side variables, studies concerning user-side variables have generated conflicting findings.'

Sin and Kim go on to argue that this is to be partly attributed to the differences in study design and analysis methods. Poll (2012), examining the new ISO standard for assessing the impact of libraries, recognises that the existing literature has 'a striking variety in terminology' (2012, p.122). Poll differentiates between observed evidence (both open and covert), such as observing behaviour, data mining and comparison of usage data with the user's educational success and solicited evidence, such as surveys, interviews and focus groups.

Research into student academic library use and demographic characteristics is less advanced than much of the work done in the public library sector, but it does exist. Several studies have focused upon gender, particularly in relation to students' use of the Internet. In a review of the literature, Fortson et al. (2007) noted that male college students tended to use the Internet for entertainment.

However, unlike previous studies (Weisser, 2000, Odell et al., 2000), Fortson et al. found that men and women 'did not differ on their use of the Internet for educational or academic assistance (eg, library services, course access).' (2007, p.142). A 2009 study (Jones et al, 2009) found that male college students spent more time online than female students, but that there was greater library use (in person and online) by the female students. It also found that female students are more likely to use mainstream information sources such as search engines and library websites, while male students are more likely to include nonmainstream online sources.

Cox and Jantti (2012) reported in their research that there were gender differences in library electronic resource usage, finding that although women used e-resources more than men, the male students , 'get a lot more traction than women from increasing their use of resources, both print and electronic.' (2012, p.315). This all suggests that gender is worth investigating further when considering how different groups of students use the library.

Fortson et al. (2007) describe the picture of differential library use based on race as 'complex'. But a number of studies recognise the importance of understanding differences in usage between various racial groups – as Whitmire (2003) says, 'understanding the academic library use of a culturally diverse student body and the factors associated with these experiences, academic librarians can provide better services that assist undergraduates with their academic integration and subsequent retention and academic achievement.' (2003, p.148). In addition to Whitmire's research, there have been a number of studies in the United States, which concentrated on the use by Hispanic students. Jones et al. (2009) found that Hispanic students were less likely to use the internet for academic use and the library for long periods of time in comparison with their counterparts. Green (2012, p.107) concludes that although Hispanic students have similar needs to the students body at large and that any help that serve Hispanic students serve all students, there are also direct measures that could be undertaken to target Hispanic students specifically.

Previous studies in the public library sector have looked into age (Koontz, 2005), but studies of usage in academic libraries have tended not to include this demographic. Cox and Jantti (2012) found that age did have an impact, with users over 39 getting less benefit from both borrowing and electronic resources than their younger counterparts.

This study seeks to extend and expand on the existing literature by testing the relationships between library usage data and demographic characteristics at Huddersfield. The data available for the study allows us to explore actual, as opposed to reported, usage, and to examine a larger sample than was available to many previous studies. The research is part of Huddersfield's Jisc funded Library Impact Data Project (Jisc, 2011), which set out to explore relationships between library usage and attainment, in order to improve student attainment and retention. Phase 2 of the project aimed to enrich the data from phase 1 (Stone and Ramsden, 2012) by testing to see whether there was a relationship between demographic variables (gender, ethnicity etc.) and all measures of library usage, and to see which factors carry the most weight in such a relationship. It was hoped that the additional data would lead to a further understanding of the link between library activity data and student attainment, including investigation into causal effects. By demonstrating practical examples that support the hypothesis from phase 1 the project sought to allow service improvements to be targeted at point of need and to refine decision making. As Metoyer (2000) states, 'in planning library and information services, the rule of thumb is that the services and programs should match the information needs of the clientele,' (2000, p.157): the aim of this work is to test whether demographic characteristics affect the information needs and behaviours of undergraduate students in order to help librarians improve their services.

Data

The first phase of LIDP looked at 33,074 students in eight universities. Phase 2, which ran from January 2012 - October 2012 concentrated on 2,000 undergraduate students based at the main Huddersfield campus who were awarded a final grade in July 2011. For each student, demographic data and final results were extracted from Huddersfield's student record system (SITS: Vision, known locally as ASIS). These data were supplemented by information routinely collected by the library systems. Some data were available for all three years of the students' course; others were only available for the last two years, or the final year. These dimensions of usage, which build upon those used in the original study (Stone and Ramsden, 2012) are outlined in Table 1.

Table 1: Dimensions of usage

Measure	Notes	Years
Number of items borrowed		Three
Number of library visits		Three
Hours logged into library PC	The way the system records this means that '1 PC hour' indicates that the student was logged into the computer at least once during a single hour on a single day	Two
Hours logged into e-resources	As for hours logged into library PC	One
Number of PDF downloads		One
Number of e-resources accessed	Individual e-resources are determined by Huddersfield's systems and range from individual journal subscriptions to large journal platforms	One
Number of e-resources accessed 5 or more times		One
Number of e-resources accessed 25 or more times		One
Percentage of e-resource usage occurring on-campus	Using total number of e-resource logins	One

The demographic characteristics for ethnicity and country of domicile were supplied by Huddersfield at a highly granular level and would have been very difficult to analyse, both in terms of the statistical tests planned and with a view to protecting student confidentiality. Therefore, we aggregated the categories provided by the system into more manageable categories, as outlined in Table 2. This was a similar procedure to that used by Whitmire (2003), who found that, '[b]ecause of the small sample sizes and in order to allow for easier data analyses and reporting of data, the Asian American, Native American, Latino and African American undergraduate groups were collapsed into one group named "students of color."' (2003, p.150)

Table 2: Ethnicity and country of origin groupings

Characteristic	Category	Contains
Ethnicity	Asian	Asian or Asian British - Pakistani
		Asian or Asian British - Indian
		Asian or Asian British - Bangladeshi
	White	White English
		Other White background
		White Irish
		White Scottish
		White Welsh
	Black	Black or Black British - Caribbean
		Black or Black British - African
	Mixed	Mixed - White and Black African
		Mixed - White and Black Caribbean
		Other Mixed background
		Mixed - White and Asian
	Chinese	Chinese
	Other	Other Ethnic background
		Other Asian background
		Black - Other
Country of domicile	New Europe	Post-2000 EU accession countries
	Old Europe	EU countries before 2000
	China	
	Rest of world	

Method

Data on the dimensions of usage were tested using the Komogorov-Smirnov test and were shown to be non-normally distributed. We therefore used the same nonparametric tests as were used in the first phase of the project.

For variables with two categories, we used the Mann-Whitney test. For variables with more than two categories, we used the Kruskal-Wallis test, followed by successive Mann-Whitney tests, using the Bonferroni correction to minimise the risk of a Type 1 error. In some cases we were able to test all groups against each other; for others, we had to select a control group and test the other groups against it. The tests where this applies are identified in the findings section, below. We selected the control group so that we were comparing the majority group with minority ones, recognising that differences between majority and minority group behaviour is more likely to be missed in casual observations, and that this represents the most valuable way of interpreting the data to explore student needs.

For each correlation and Mann-Whitney test, we calculated the effect size and classified this according to Cohen (1988, 1992), as recommended by Field (2009). An effect size of .1 is small, of .3 is medium and of .5 is large.

Findings

Table 3 shows the effect sizes for age and usage. We divided students into mature (aged 21 or over on entry) and non-mature, and tested the difference between them using a Mann-Whitney test. The effect size shows which of the two groups had the higher usage. The minus signs are a product of the test used and do not indicate lower usage. All results shown are significant at the .05 level.

Table 3: Age and usage

Factor	Mature students	Non-mature students
Number of items borrowed	-.064	
Number of library visits		-.138
Hours logged into library PC		-.054
Hours logged into e-resources	-.110	
Number of PDF downloads	-.054	
Number of e-resources accessed	-.132	
Number of e-resources accessed 5 or more times	-.114	
Number of e-resources accessed 25 or more times	-.087	
Percentage of e-resource usage occurring on-campus		-.083

Most of the effect sizes are very small, with only four breaking the boundary into 'small' as defined by Cohen (1992). Where there are effects, the mature students tend to have higher usage: this applies particularly to e-resource use, where usage is higher on hours logged in and number of resources accessed once and five or more times. Young students, on the other hand, are more likely to visit the library, and have a higher proportion of e-resource use that happens on-campus.

Table 4 shows the effect sizes of gender and usage, again using a Mann-Whitney test. All results shown are significant at the .05 level.

Table 4: Gender and usage

Factor	Men	Women
Number of items borrowed		-.244
Number of library visits	-.142	
Hours logged into library PC		
Hours logged into e-resources		-.116
Number of PDF downloads		-.106
Number of e-resources accessed		-.148
Number of e-resources accessed 5 or more times		-.113
Number of e-resources accessed 25 or more times		
Percentage of e-resource usage occurring on-campus	-.093	

On two dimensions (hours logged into library PC and number of e-resources accessed 25 or more times) there was no statistically significant difference between men and women. On all other dimensions there was a small effect. Women show higher usage than men on all the dimensions to do with use of library resources, but actually visit the physical library less often than men.

Table 5 shows the effect sizes of ethnicity and usage. In this case, because we had more than two groups, we began with the Kruskal-Wallis test, and moved onto subsequent Mann-Whitney tests to identify the differences between groups. We applied the Bonferroni correction for the effect sizes, so all results shown are significant at the .01 level. Because of the number of groups, we used a control and tested all the other groups against it: the control group was the majority group, white students.

Table 5: Ethnicity and usage

Factor	Asian		Black		Mixed		Chinese		Other	
	A	W	B	W	M	W	C	W	O	W
Number of items borrowed		-.041	-.046					-.108		-.124
Number of library visits	-.251		-.251		-.095				-.076	
Hours logged into library PC	-.127		-.127		-.078					
Hours logged into e-resources										
Number of PDF downloads										
Number of e-resources accessed								-.097		
Number of e-resources accessed 5 or more times										
Number of e-resources accessed 25 or more times										
Percentage of e-resource usage occurring on-campus	-.172		-.152							

Many of the tests did not show statistical significance, and those that did tended to show relatively small effect sizes. But it is noteworthy that both black and Asian students show more library visits and PC usage than white students, and that a higher proportion of their e-resource use occurs on-campus. Chinese and 'other' students (a catch-all category and thus to be treated with some caution) borrow fewer items than white students. Chinese students also use fewer e-resources, suggesting that there may be some issues with the breadth of their reading.

Table 6 shows the effect sizes of country of domicile (the place where students live when they are not at university). UK residents are the control group. We applied a Bonferonni correction to the results so all those shown are significant at the .013 level.

Table 6: Country of domicile and usage

Factor	New EU		Old EU		China		Rest of world	
	NE	UK	OE	UK	C	UK	ROW	UK
Number of items borrowed			-.113			-.144	-.073	
Number of library visits				-.066		-.098		-.099
Hours logged into library PC			-.082				-.089	
Hours logged into e-resources	-.159					-.075		
Number of PDF downloads	-.175		-.088					
Number of e-resources accessed	-.104					-.119		
Number of e-resources accessed 5 or more times	-.152					-.074		
Number of e-resources accessed 25 or more times	-.207		-.092					
Percentage of e-resource usage occurring on-campus						-.073		

Here, there are a relatively large number of statistically significant differences, although most effect sizes remain small. The New EU students (we defined New EU as those countries joining the EU on or after January 2000) seem the 'most' different from UK students, particularly in their use of e-resources, where they are higher users with a small effect on all dimensions. Old Europeans borrow more items than UK students. The Chinese sub-group again shows lower usage than the UK control on both the number of items borrowed and the number of e-resources accessed.

Discussion

In general, the effect sizes are small, and in many cases they are tiny. Nonetheless, they indicate that demographic factors do have a relationship with library usage: these results disagree with the research of Fortson et al. (2007), who did not find a difference in internet use for educational or academic assistance (e.g. library services, course access), although Fortson et al. reported that the 2007 results themselves were in contradiction to earlier work by the same author (Fortson et al., 2007, p.142). However, the results do concur with recent research performed by Cox and Jantti (2012).

Table 3 shows that, on most dimensions, mature students show a small but significant difference from their non-mature counterparts, and that in most cases their usage is higher. Their comparatively high use of e-resources, especially off-campus, and low use of the campus-based library, suggest that they value flexibility highly, and prefer to do their reading on their own terms. This may be due to outside commitments – all the students are full-time so the impact of work should not be felt disproportionately among mature students, but they are perhaps more likely than 21-year-olds to have established demands upon their time, including families. Furthermore, they may be more able to afford personal computing equipment, increasing their ability to access e-resources and to use them in a variety of locations. Higher usage of e-resources by mature students further explodes the 'digital native' myth of Prensky (2001) and supports the work of White and Le Cornu (2011) regarding the 'visitors and residents' continuum, thus individuals are not natives and immigrants, but dip in and out of technology as required.

Tables 5 and 6 suggest that country of domicile is more important than ethnicity in its relationship with library usage. This makes sense: it seems likely that students in different regions will receive different early training on how to find and use information resources, and that the cultural differences in this learned behaviour are perhaps more important than differences between ethnic groups. The synergy between the results for ethnically Chinese students and students whose country of residence is China is striking. We have not tested to see whether most students at Huddersfield who are Chinese come from China, but it seems likely that some homogeneity between the two groups is responsible for the similarity in the findings. In both sets of results, students with a Chinese background borrow fewer items and use fewer e-resources. We hypothesise that this may tell us something about their breadth of reading: that they are sticking to a few core texts and resources rather than reading widely around their subjects. This stands in stark contrast to students from what we have termed 'New Europe' – they are heavier users of e-resources, and use a wider variety of electronic content, suggesting that their reading is broader than their UK-resident counterparts. Anecdotal evidence from discussions at the Internet Librarian Conference (Pattern, 2012) have suggested that this may be down to Chinese students' study habits, who have been observed to study in groups rather than individually – this unsubstantiated claim is certainly worthy of future study. Sin and Kim (2008) also found that ethnicity was statistically significant in their research on use and non-use of public libraries.

It is important to stress that these explanations remain hypotheses. The fact that there is a statistically significant difference between two groups of people does not tell us *why* that difference exists, or even what it means. We have suggested that students from New Europe have greater breadth of reading, based on their wider use of e-resources, but in fact it could simply indicate that they have very inefficient search strategies. Their repeat use of several resources could indicate that they read in some depth, returning to a large number of resources many times, or it could simply mean that they prefer not to download or print content but rather return to it in the cloud. The difficulty of distinguishing between accessing content and using it, and the difficulty of tracking the use of print content in particular, mean that these suggestions require further qualitative investigation before explanations can be given.

It is also important to stress that we were not able to test for interactions between the different demographic factors. For example, we do not know whether Asian students are disproportionately male, and whether it is the Asian-ness or the male-ness that affects their usage patterns – or, indeed, an interaction of the two characteristics. Perhaps most importantly, we were not able to test the relationship between discipline and demographic characteristics. Indications from elsewhere in the study suggest that discipline exerts a much bigger influence on usage (not a surprising finding), and in fact many of the differences we see in the demographic variables may simply be a ripple effect from, say, the dominance of men over women in computing and engineering. Further testing would be required to establish whether this is, in fact, the case.

Conclusion

This study has provided useful evidence which suggests that there is a relationship between demographic variables and several dimensions of library usage at the University of Huddersfield. In most cases, the effect is very small, but in some it may have an important effect on student library usage. Since previous work (Stone and Ramsden, 2012) has demonstrated a relationship between

library usage and student results, these demographic differences may mean some students are losing out on an opportunity to improve their results.

However, it should be noted that there are a number of limitations to the study. It focused on one year of graduating students at a single university in the UK. Further research would be useful to explore whether the same demographic effects are observed in other institutions: it would be particularly interesting to compare universities from the different mission groups in the UK.

As with much quantitative research, the findings allow us to identify relationships but not to explain them. The study presented here finds a relationship between several dimensions of library usage and demographic variables, but we can only hypothesise about the causal reasons behind these relationships. Further, qualitative, work would be required to fully explain the effects we have seen in this study.

Furthermore, although library usage and age provided a significant difference in this study, the groupings were limited by the information provided by university systems, which defined 'mature' as 21 or above. It is suggested that before any significant conclusions are drawn about this demographic the age groups are broken down further.

This study was not able to explain the observed differences between demographic groups. Poll (2012) suggests that a mixed methods approach is the most effective way of exploring the impact of libraries and this research would seem to support this hypothesis. The statistical analysis was able to show a relationship, but further work is needed to explore exactly why these relationships exist. For example, Robinson and Reid (2007) identified certain barriers which prevented students from asking for help; we should explore whether these are factors among some of the lower-use groups in our study. The first round of the Library Impact Data Project used focus groups to further probe the statistical findings (Stone and Ramsden, 2012). This would be a useful next step for this project. Informal discussions with library staff have already identified some possible explanations for the effects that we have observed, and it would be useful to consult more widely with those who work on a regular basis with students. We would also like to explore our findings with groups of students who have noticeably different patterns of usage from the overall majority: for example, working with Chinese students to explore their low use of resources, or New European students to understand their broad reading habits. Qualitative research may also help us to understand something of the interaction between variables, by exploring the reasons that students themselves give for their usage patterns.

It would also be useful to replicate this study with data from other universities. This, along with the focus groups, will provide librarians with the information that they need to improve their services and ensure they meet the needs of all students.

Notes

1.   The Fullbright Commission provide an unofficial chart with approximate grade conversions between UK classifications and U.S. Grade Point Average (GPA). Available online at http://www.fulbright.org.uk/study-in-the-usa/postgraduate-study/applying/transcript#how%20do%20i%20convert.

References

Auckland, M. (2012), "Re-skilling for research: An investigation into the role and skills of subject and liaison librarians required to effectively support the evolving information needs of researchers," RLUK Report, available at: http://www.rluk.ac.uk/files/RLUK%20Re-skilling.pdf (accessed 29 December 2012).

Bohme, S. and Spiller, D. (1999) *Perspectives of Public Library Use 2: A Compendium of Survey Information*, Library & Information Statistics Unit (LISU), Loughborough University.

Cohen, J. (1988), *Statistical Power Analysis for the Behavioural Sciences,* 2nd Edition, Lawrence Erlbaum Associates, Hillsdale, NJ.

Cohen, J. (1992), "A power primer", *Psychological Bulletin*, Vol. 112 No.1, pp.155-159.

Cox, B. and Jantti, M.H. (2012), "Capturing business intelligence required for targeted marketing, demonstrating value, and driving process improvement", *Library and information science research*, Vol.34 No.4, pp.308-316. http://dx.doi.org/10.1016/j.lisr.2012.06.002

Debono, B. (2002), "Assessing the social impact of public libraries: what the literature is saying", *Australasian Public Libraries and Information Services*, Vol.15 No.2, pp.80-95.

Farmer, L.S.J. (2006), "Library media program implementation and student achievement", Journal *of Librarianship and Information Science*, Vol.38 No.1, pp.21-32. http://dx.doi.org/10.1177/0961000606060957

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

Fortson, B. L., Scotti, J. R., Chen, Y., Malone, J., Del Ben, K. S. (2007), "Internet use, abuse, and dependence among students at a Southeastern regional university", *Journal of American College Health*, Vol.56 No.2, pp.137–144. http://dx.doi.org/10.3200/JACH.56.2.137-146

Green, D. (2012), "Supporting the academic success of Hispanic students", Duke, L.M. and Asher, A.D., *College libraries and student culture: what we now know*, American Library Association, Chicago, IL, pp.87-108.

Jisc (2011), "JISC Activity Data", available at http://www.jisc.ac.uk/whatwedo/programmes/inf11/activitydata.aspx (accessed 29 December 2012).

Jones, S. Johnson-Yale, C., Millermaier, S. and Pérez, F.S. (2009), "U.S. college students' Internet use: Race, gender and digital divides", *Journal of Computer-Mediated Communication*, Vol.14 No.2, pp. 244–264. http://dx.doi.org/10.1111/j.1083-6101.2009.01439.x

Koontz, C.M., Jue, D.K. and Lance, K.C. (2005), "Neighborhood-based in-library use performance measures for public libraries: A nationwide study of majority–minority and majority white/low income markets using personal digital data collectons", *Library and Information Science Research*, Vol.27 No.1, pp.28-50. http://dx.doi.org/10.1016/j.lisr.2004.09.003

Linley, R. and Usherwood, B. (1998) *New Measures for the New Library: A Social Audit of Public Libraries,* Centre for the Public Library in the Information Society. Department of Information Studies, University of Sheffield, Sheffield.

Metoyer, C.A. (2000), "Guest editorial: missing links in reaching culturally diverse students in academic libraries", Journal of Academic Librarianship, Vol.26 No.3, pp.157-158. http://dx.doi.org/10.1016/S0099-1333(00)00094-X

Oakleaf, M. (2010), *The value of academic libraries*, Association of College & Research Libraries, Chicago, IL, available at: http://www.ala.org/ala/mgrps/divs/acrl/issues/value/val_report.pdf (accessed 29 December 2012).

Odell P.M., Korgen K.O., Schumacher P. and Delucchi M. (2000), "Internet use among female and male college students". *CyberPsychology Behavior,* Vol.3 No.5, pp.855–862.

Ontario Library Association, School libraries and student achievement in Ontario, Ontario Library Association, Ontario, available online at: http://www.peopleforeducation.com/school-libraries/2006 (accessed 29 December 2012).

Pattern, D. (2012), "Library Impact Data Project", paper presented at Internet Librarian International 2012, 30-31 Oct 2012, Olympia Conference Centre, London, UK, available at: http://eprints.hud.ac.uk/15766/ (accessed 29 December 2012).

Poll, R. (2012), "Can we quantify the library's influence? Creating an ISO standard for impact assessment", *Performance Measurement and Metrics*, Vol. 13 No. 2, pp.121 – 130. http://dx.doi.org/10.1108/14678041211241332

Poll, R. and Payne, P. (2006), "Impact measures for libraries and information services", *Library Hi Tech*, Vol. 24 No. 4, pp.547 – 562. http://dx.doi.org/10.1108/07378830610715419

Prensky, M. (2001), "Digital natives, digital immigrants", *On the Horizon*, Vol.9 No.5, pp.1-6.

Robinson, C.M. and Reid, P. (2007), "Do academic enquiry services scare students?" *Reference Services Review*, Vol. 35 No. 3, pp.405 – 424. http://dx.doi.org/10.1108/00907320710774283

Sin, S-C.J and Kim, K-S (2008), "Use and non-use of public libraries in the information age: A logistic regression analysis of household characteristics and library services variables", *Library & Information Science Research*, Vol.30 No.3, pp.207-215. http://dx.doi.org/10.1016/j.lisr.2007.11.008.

Stone, G., Pattern, D. and Ramsden, B. (2012) "Library Impact Data Project: hit, miss or maybe?" in Hall, I., Thornton, S. and Town, S., *Proceedings of the 9th Northumbria international conference on*

performance measurement in libraries and information services. University of York, York, pp. 385-390.

Stone, G., and Ramsden, B. (2012), "Library Impact Data Project: looking for the link between library usage and student attainment*", College and Research Libraries*, preprint, available at: http://eprints.hud.ac.uk/15038/ (accessed 29 December 2012).

Suaiden, E.J. (2003), "The social impact of public libraries", *Library Review*, Vol. 52 No. 8, pp.379 – 387. http://dx.doi.org/10.1108/00242530310698520

Weiser, E.B. (2000), Gender differences in Internet use patterns and Internet application preferences: a two-sample comparison. *CyberPsychology Behavior,* Vol.3, No.2 pp.167–177. http://dx.doi.org/10.1089/109493100316012

White, D.S. and Le Cornu, A. (2011), "Visitors and residents: A new typology for online engagement", *First Monday*, Vol.16 No.9, available at: http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/3171/3049 (accessed 31 December 2012).

Whitmire, E. (2003), "Cultural diversity and undergraduates' academic library use", Journal of Academic Librarianship, Vol.29 No.3, pp.148-161. http://dx.doi.org/10.1016/S0099-1333(03)00019-3