Learner Use of Online Educational Resources for Learning (LUOERL) – Final report

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134 pp

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Main report

Executive summary

All statements are linked to key numbered paragraphs of the Overview (cited as O.n where n is the paragraph number) and key sections in the main report (e.g. 5.3).

Findings

- The literature on learner use of online educational resources is very immature, with a lack of meta-reviews. The overwhelming majority of published studies do not generalise beyond their particular contexts of study. There is no consistent methodology. [O.21, O.25.c/h, O.26]
- There are significant gaps in the literature: there are almost no meso-level studies, no international comparisons, and very little on learners other than university undergraduates. [O.19 and O.25.h; O.25.d/c/g; O.18, O.35]
- The JISC/HEA OER Programme has so far produced relatively little data on learner use (some partial exceptions are noted). This is to a lesser extent true for all OER literature – but the non-OER literature is much richer. [O.23, 5.1.3; O.43; 5.3]

The following are the findings from the literature review that seem most capable of generalisation:

- In formal learning, the rationale for searching online is dominated by assessment requirements, explicit or implicit. [O.30, O.32]
- There is evidence for the following:
  a. learner need for structure in or above the resources [O.39];
  b. the importance of a task-based pedagogy that guides learner use [O.39];
  c. student use of multiple methods for discovery (browsing, search engine, tutor and peer guidance), but a particular approach is more shaped by pedagogical task context than by subject area differences (or other contextual variables) [O.42];
  d. student preference for audio over video [O.31, 5.1.2];
  e. student preference for tools that are previously familiar to them [5.4.1.10, 5.4.2.A/F];
  f. positive student attitudes to sharing. [5.1.2, OTTER, MEDEV].
- Only one key study could be found that demonstrated OER having an impact on student attainment. [O.42, 5.4.2.C]
- Only one key study addressed how learners retain access to resources (around half of the sample used bookmarks). [O.40, 5.4.1.11]
- Students are found to be generally lacking in their understanding of provenance and quality. [O.41, 5.4.1.12]
- A more nuanced approach to digital literacy than the 'digital natives/digital immigrants' discourse is now gaining traction in the literature. [O.34, 4.2, 5.2.2, 5.3.1]
- Some evidence exists that the challenge of designing resources for users with unknown characteristics (including their level of prior understanding) acts as a barrier to OER development. [O.32, 5.4.1.10]
- There are few UK or EU universities with institutional policies on OER. [O.46]

Recommendations

Funded research [O.47]

1. *Learner use projects at 'meso' scale should be funded in at least the areas listed below.* Ideally these projects should be as broad and large-scale as possible and involve several institutions from the various parts of the HE sector. An uprating of the quality and uniformity of research methodologies is essential.

    - Student use of Wikipedia – in liaison with the Wikimedia Foundation.
    - Student use of academic-generated podcasts (audio).
    - Student use of videos including lecture-casting.
    - Student use of OER and online resources created *by other students*.
    - Student study-time issues for students accessing OER and online resources.

2. *Extending the language coverage of the LUOERL bibliography*: extend to include research material in Dutch, Swedish and Spanish at least. [O.48]

3. *An Open Educational Bibliography of OER*: A comprehensive open and editable bibliography of papers and other literature on all aspects of OER should be generated. (The current project can be regarded as a pilot of this.) [O.49]

4. *Guide to good practice*: A study team should produce a *practical* guide aimed at students, staff and external examiners, to cover the issues raised by study and citation of OER. [O.50]

Policy and practice [O.51]

1. *Institutions should pay more attention to student views and experience of OER and online resources*.

2. *Institutions should consider together with their external examiners how best to foster judicious use of resources (including OER) by students*: especially in their project and dissertation work.

3. *In course redesign, institutions should aim to make more use of OER* and externally provided free-of-charge, non-open resources (e.g. via JISC repositories) in future programmes.

4. *Institutions should ensure when providing public information about their courses that issues of study time and contact hours for courses do not get trapped into a classroom-based narrative* that does not provide a realistic description of the learner experience.

Caveat

Our findings are complex and detailed. The 12 headings proposed in the Invitation to Tender capture only a fragment of the richness of the findings. For experts, a detailed reading of the full report is advised.

0. Overview

This is the final report of the project **Learner Use of Online Educational Resources for Learning** (LUOERL), funded by the Higher Education Academy.

It is a report of around 45,000 words, including all the references but excluding all appendices (including these, it rises to around 52,000 words). It has 134 pages in total.

It is printed in 11-point Calibri.

Due to the length of the report, we start with this nine-page Overview.

Section 1: Background

1. Sero Consulting Ltd was asked by the Higher Education Academy to undertake a literature review "to provide a greater understanding of the ways in which learners, whether or not in formal education, use online resources to aid their learning experiences and the factors which influence the selection of resources". It was anticipated that "collectively this work will enable practitioners, policy makers and researchers to adopt more effective evidence-informed or research-informed approaches to their decision-making, research and practice on matters relating to the use of open-educational resources in learning and teaching".

2. Twelve areas of interest for the research were proposed by the HEA: learners' rationale for searching for online resources; types of online resources being sought; complexity/granularity of resources being sought; how resources found are used; whether learners in some subject areas appear to conduct more searches for online resources than others; educational level of resources being sought; location of resources; extent to which resources are the principal or a supplementary source of learning materials; whether or not learners are in formal education; enablers and barriers to use of online resources; how learners retain access to the resources; and provenance information and copyright status of resources being used.

3. There were two key outputs of which the first was to be a literature review, "to contain an executive summary; outline of methodological approach; identification, selection and analysis of the literature; conceptual perspectives; findings; conclusions, implications and recommendations; and references". That is this document.

4. The second key output was to be "a database of literature which is relevant to the review topic and which can be made available by the HEA and JISC to the sector as a searchable resource to facilitate the identification of literature by researchers and practitioners in the future". After further discussion it was agreed to use Mendeley, a newish low-cost reference management and social networking system developed in the UK.

Section 2: Methodology

5. Sero proposed that the JISC/HEA OER Programme reports and 30 project reports would be one of the two key starting points, while the other would be a sweep of experts and an extensive trawl of OER-related and online-resource-related publications and grey literature relevant to learner use.

6. The literature search for publications used EBSCOhost, which incorporates ERIC (the world's largest digital library of education literature), Education Research Complete (which provides indexing and abstracts for more than 2,100 journals as well as full text for more than 1,200 journals), and Library, Information Science & Technology Abstracts (which indexes more than 700 journals plus books, research reports and proceedings).

7. Contrary to the situation with some other topics we did not find any great difficulty with the meaning of 'open educational resources' as judged against the literature we found. Much harder was to determine the scope of 'online resources' (beyond OER) and to ensure that we did not collect material that went into learner use of *systems* not *resources*.

8. We tried to ensure that we collected material from, or about, any relevant developed country – provided that the material was in English. In the end we collected material from sources in UK, US, Canada, Australia, South Africa, India and Taiwan, but also from Netherlands and Finland – and even Ecuador and Pakistan.

9. We had insufficient resources to do systematic journal searches in other languages, but links to consortium partners in EU projects were made and OER country reports on WikiEducator were checked.

10. We evolved a guiding principle consistent with the Mendeley ethos – that is, that when we captured material (because it looked promising) we did not throw it away, but moved it to an OER group outside our project scope or ranked it initially as 'collected in error'.

11. Our ranking system evolved over time but was based on a five-point system: 1: somewhat related; 2: related; 3: relevant; 4: very relevant; 5: most relevant.

12. Two Mendeley groups were set up core to the project: *Learner Use of OER* and *Learner Use of non-OER Online Resources*. Other groups were set up round this for less relevant OER material and to support community building.

13. Links were made with the few OER-related activities already present on Mendeley and with key research networks such as ELESIG and STELLAR (EU).

14. For dissemination a project wiki was set up and a page created on the Sero website.

Section 3: Identification, selection and analysis of the literature

15. A long list of search keywords was evolved – OER; OERs; open educational resources; open educational; open resources; open content; education; digital textbooks; (university) digital library users; open/free digital textbooks; (digital) information-seeking behaviour; information seeking; information behaviour; digital information literacy; digital information behaviour; information; research; online; online research; internet; internet research; e-books; e-textbooks; e-journals; student(s); learner(s); user(s); end users; use; student use; student experience; student perceptions; Wikipedia; google; merlot; iTunes U; RLO; RLOs; digital; digital library; digital/information literacy; impact; evidence; scaffolding; digital natives/immigrants; millennials – and variants to cover US spellings.

16. When the literature was entered into the database, it was later tagged with: country of relevance (if not the UK); educational level; subject; project name; pedagogic aspects etc. – the set of tags changing over time (as expected from grounded theory) as concepts evolved. Each entry was tagged with a relevance level – and these often changed as papers generated more information. The tags were done by members of the team at different times – they are a start on a systematic taxonomy, not a polished set.

Section 4: Conceptual perspectives

17. As noted under #7 above we did not have much difficulty with the scope of 'open educational resources', but that of 'online resources' needed more careful analysis, especially in relation to its learner use aspect.

18. Thanks to the tagging system a number of contextual variables were captured – country of relevance, educational level, subject etc. There was a preponderance of material about university students and even many of the informal learning examples were about informal learning of individuals who were or wanted to be or had been university students.

19. We noted a lack of meso-level studies (the typical large course enrolment of a hundred or two) – sample populations tended to be small (campus universities) or large (open universities and MIT).

20. There was also a great lack of uniformity of methodology.

21. Judged from the perspective of learner use, there is a significant disconnect between the OER community and the elite of the e-learning research community – with a few notable exceptions. We have no reason to believe that this would be different in other areas of OER scholarship/research.

Section 5: Findings

22. The findings are divided into three areas (not two) since it was felt wise for analytic purposes to separate the OER area into 'JISC/HEA OER' and the rest. This section summarises the bibliometrics; the next will summarise the findings.

23. The first section is a meta-analysis of all the JISC/HEA OER Programme Pilot Project reports and associated analyses, but it was felt convenient to include OpenLearn also. There are 29 OER Pilot projects and also 20[1] RePRODUCE projects, making 49 in all. These entries are all in the Learner Use of OER group, but tagged to identify them separately. OTTER was particularly notable in having done a student survey.

24. The second section is in essence an annotated bibliography of 80 key OER papers, analysed over the five levels of relevance in appropriate detail. Only levels 3, 4, and 5 are in this section – the lower levels are devolved to Appendix 4.

[1] There are supposed to be 20 such reports, but one could not be located and so is not in the database.

25. A key conclusion is that the resources exploring learner use of non-'JISC/HEA OER' surveys published to date are far from cohesive – and far from comprehensive.

    a) 'Learner Use of OER' as a topic has not yet been subject to the same level of scrutiny as learner use of better established educational tools. We assume that it is only a matter of time before this becomes a more fully fledged research arena.
    b) Many publications whose titles or abstracts seem to imply a learner use focus do not realise this in the full text (often because 'user' is defined as 'faculty member' or 'OER creator' only).
    c) We have the sense that numerous learner use authors do not consider themselves part of (or connected to) the more active OER community. Their publications, therefore, often stand alone, lacking bibliographies of great scale or relevance to a researcher.
    d) A large proportion of publications and studies stem from UK universities, although this was not the intended focus of our research – our coverage was global (among publications in English). It is clear that the JISC/HEA OER Programme and the presence of The Open University/OpenLearn have had a significant impact, unequalled in any other English-speaking country.
    e) Similarly, many studies stem from, include or make mention of MIT OCW, reaffirming its long-standing prominence in this field – and more than 20 publications reference funding from the US-based William and Flora Hewlett Foundation, the leading grant-maker for OER.
    f) Not many papers yet seem to be emanating from EU projects, partly because they do not (so far) have learner use as a focus.
    g) An emphasis on assessing the experiences of learners situated in postsecondary educational environments is clear, leaving major gaps in our understanding of learner use of OER in primary, secondary, postgraduate, adult (except for university-level at open universities) and informal education.
    h) Studies involving human subjects tend to focus on the experiences of either small clusters of three to 100 students (typically under 50), or broad swathes of users (upwards of 3,000). Data may be collected through a combination of interviews; surveys; observation; focus groups; assessment; metrics; user logs; emails; and other means. There is little uniformity in methodology here, and so it is difficult to compare these studies and their results.
    i) The most popular academic dissemination routes include (but are not limited to) refereed journals (both open and restricted) and conference proceedings.
    j) Articles addressing learner use of OER tend to be neutral in tone and avoid sweeping generalisations of the sort more commonly found in surveys of the repositories available. Without a foundation of past studies to build upon, authors are appropriately exploratory and open about the limitations of the datasets with which they work.
    k) The educational usage and impact of iTunes U and Wikipedia are of particular interest to researchers outside of learning technology, with many articles published in mainstream media and general interest publications (especially in the US) – this may have an awareness-raising effect for OER in general.

26. Generally speaking, we do find a richer set of articles, conference proceedings, and other media when we allow our research to stray beyond the confines of OER alone. Decades of well-cited research undertaken by the library science community in particular thoroughly address the search for, and discovery of, digital library resources in particular; these seem especially applicable to 'learner selection and use of OER'.

27. The third and final section looks at learner use of non-OER online resources. Again it is in essence an annotated bibliography of 153 key non-OER papers, analysed over the five levels of relevance in appropriate detail. Only levels 3, 4, and 5 are in the section – the lower levels are devolved to Appendix 4.

28. The profuseness and level of annotation of the elements in the two bibliographies should make it relatively easy to process the bibliographies to answer specific questions not envisaged in the original Invitation to Tender.

29. The overall findings are categorised under the 12 headings of the Invitation to Tender.

30. *Learners' rationale for searching for online resources*: The OER literature is dominated by the large open university[2] and MIT studies. It is debatable how applicable these are to the generality of UK universities and their students. The non-OER literature typically addresses this issue from the standpoint of assessment-driven student behaviour. There is clear room for studies looking at the middle ground.

31. *Types of online resources being sought*: JISC/HEA OER projects encompassed a wide range of formats and noted the student preference for audio over video confirmed by non-OER work. The project work still seems dominated by supply-side aspects. Non-OER work confirms the commonly held view that today's learners utilise numerous types of media. They hint at the primacy of Wikipedia and journal material, but quantitative information is scarce.

32. *Complexity/granularity of resources being sought*: OER studies tended to confirm the tension between specificity and potential for reuse (seen since the early days of RLOs). Also, students want narrative structure in, or above, the resources they use. The non-OER literature seems to focus more on students typically seeking a single item per search and hints at the assessment-driven paradigm again – or filling in gaps in an existing narrative not creating their own. It is tempting to draw the conclusion that the two types of study are in fact addressing two different student populations. Again there is clear room for studies looking at the middle ground.

33. *How resources found are used*: This leads on from the last point. Interestingly the two types of study have more in common here, with the exception of the set of OpenLearn students 'overloading' their use of resources with expectations about social networking and assessment. Possibly the topic needs to be refined to distinguish between 'How resources found are used' and 'How services providing resources (and other things) are used'. Depending on how fast

[2] This is used in its generic sense. Both the UK Open University and the Open Universiteit Nederland are active in OER – and some others also.

portfolios based on the Higher Education Achievement Report come into common use, some convergence is possible.

34. *Whether learners in some subject areas appear to conduct more searches for online resources*: This is always a topic where the effects are small and the theories are plentiful. There seemed to be no substantial studies of disciplinary difference with regard specifically to OERs. On the non-OER side, select subject-specific studies have been undertaken, but rarely in a manner that allow comparison; the issue also gets confused with that of the 'digital native'. It is tempting to suggest that the bigger differences may lie in '*how* subjects are taught' rather than '*what* subjects are taught'. It is not clear that further *research* work in this area is fruitful – but clearly the issue needs to be considered in course redesign.

35. *Educational level of resources being sought*: In OER most of the more substantial studies have concentrated on undergraduates. On the non-OER side, there is evidence that users of all levels are (on a basic level) engaged in nearly identical search methods despite their differing requirements as learners. There are also many studies asserting that high-level postsecondary students do spend a good deal of time in search of journal articles, despite gloomy prognostications to the contrary from some academics. There is need for more research work on postgraduate student needs, especially since this is an area where the UK excels, yet needs to keep its market lead.

36. *Location of resources most likely to be used*: On the OER side, the vast majority of resources that we have reviewed (via the papers on them) have been created and then *hosted* by universities in the US and the UK – but *used* by learners from many countries. So there are some interesting 'cultural leadership' and marketing issues here. On the non-OER side, many of the items used are Wikipedia (somehow rarely thought of as OER) and full-text journals, where the issues of 'where' they are 'hosted' are not so clear.

37. *Extent to which resources are the principal or a supplementary source of learning materials*: The answer seems to depend a lot on 'what did you design them for?' There is plenty of evidence from outside this study, over many years, that resources designed for principal use will be used in such a way (and also for supplementary use by others if they are OER). On the other hand, if certain universities take good care not to produce coherent sets of OER for principal use (because of fears of erosion of their customer base) then one cannot be surprised if the only use is supplementary.

38. *Whether or not learners are in formal education*: One of the driving forces for many institutions involved in OER creation and release is to broaden participation and to entice users not in formal education to sample the materials – and then perhaps 'enter' formal education (even if online). Thus the literature is bound to be skewed towards those not in formal education – or seemingly not: there is the issue that the learners may be both in formal education *and* using OER in an informal way, sourcing OER from either their home institution or elsewhere. So the question needs more careful phrasing in future studies. In particular, it is not often realised in the UK how common it is in some countries with well-developed credit transfer systems and per-credit student support loans (the US and Sweden in particular) for students to be taking courses from several institutions simultaneously.

39. *Enablers and barriers to use of online resources*: It remains true across the wider research that most of the barriers to the use of OER are the same as/or a consequence of more generic barriers to *accessing and using technologies for learning*. However, the issues of designing learning for the unknown user and the tensions between granularity and the need for scaffolding permeate much of the research. Esslemont (2007) puts it pithily: "There are several interlinked issues related to completeness of content, granularity, copyright, offline access, use, etc., that sometimes limit the effectiveness of material provided. Therefore in order to support the learner we need to understand and support ... the learner's limitations in terms of content selection, access, use and management of their personal knowledge silos on their desktop." Other barriers include: young peoples' reliance on search engines to 'view rather than read' and 'readily sacrifice content for convenience'. Students would like guidance but can be reluctant to work with librarians. Publishers' restrictions on materials can put off students when they cannot access results they find by searching.

40. *How learners retain access to the resources*: In this area there seems to be just one key study – Lim (2009) on Wikipedia; he reports that slightly more than half of the respondents accessed Wikipedia through a search engine, while nearly half accessed it via their own bookmarks. Some students still like paper and will print out longer texts if given the chance. A few use more sophisticated tools.

41. *Provenance information and copyright status of resources being used*: Students have inconsistent attitudes to provenance. The experience of the OUNL OpenER researchers is overwhelmingly that students expect the courses to be of a suitably academic level and that the university is the guarantor of quality. Elsewhere many students seem content to take on trust the validity of resources found on the web. Students tend to use Wikipedia for rapid fact-checking and background information and have generally had good experiences of it as a resource. However, their perceptions of its 'information quality' did not reflect this: it appears that the uneasiness associated with the anonymous authorships of Wikipedia has led to non-expert users' underestimation of its reliability. Students are not generally sophisticated in their understanding of things like peer review or currency: they are weak at determining the quality of the information that they find on a website, and may in fact judge the validity of a website based on how elaborate it looks. In a study analysing young adults' credibility assessment of Wikipedia, a few lacked even such basic knowledge as the fact that anyone can edit the site.

42. Beyond these 12 topics, some other issues cropped up:

    - *Students discover online resources in multiple ways*: e.g. in the Open Nottingham project survey, 35% of respondents said they had previously used OER and, of these, 67% had found resources through browsing, 56% had used a search engine, 33% had been told of the resources by lecturers and 6% were from peer recommendations.
    - *There is some evidence that OER influences selection of courses or institutions*: both at campus-based and open universities.
    - *One key study shows that OER has an impact on student attainment*: but this was from an elite US university having made large investments in content over several years.
    - *Numerous studies identify university libraries as a critical conduit to digital resources.*

- *Learners are found to be predictable in their choice of digital resources, and to rely on tools that have worked for them before.*
- *Almost everyone starts with Google; and wants their digital library to be more like it.*

Section 6: Conclusions, implications, recommendations

43. *There is still a great deal to be researched about learner views and use of OER and online resources generally, in the UK*: in particular institutions who were involved in OER Phase 1 should be encouraged to complete the evaluations of learner use and attitudes that many of them promised to undertake.

44. *'National policy aspects of OER' is a topic not well covered by e-learning researchers*. It does relate to learner use because increasingly governments are listening more closely to student views, often via national surveys.

45. *Elite networks of e-learning researchers have little interest or involvement in OER aspects*. Steps should be taken to break down barriers and thereby uprate the quality of OER research.

46. *There still seem to be few UK or EU universities with* university-wide *policies and strategies on OER, not only in relation to their student focus.*

47. *Learner use projects at 'meso' scale should be funded in at least the areas listed below.* Ideally these projects should be as broad and large-scale as possible and involve several institutions from the various parts of the HE sector. They should not involve creation of any new material. It may be appropriate if some of the funding is channelled via MELSIG and ELESIG. An uprating of the quality and uniformity of research methodologies is essential.

    - Student use of Wikipedia – in explicit liaison with the Wikimedia Foundation Public Outreach Department.
    - Student use of academic-generated podcasts (audio).
    - Student use of videos including lecture-casting.
    - Student use of OER and online resources created *by other students*.
    - Student study-time issues for students accessing OER and online resources.

48. *Extending the language coverage of the LUOERL database*: the database is English-language only and there is a risk that missing material especially from Netherlands and Sweden, and maybe from some other EU countries as well as Latin America, contains relevant insights.

49. *An Open Educational Bibliography of OER*: in order to raise the quality level of OER research, it must increasingly conform to the standards and norms that the best researchers expect. So a comprehensive open and editable bibliography of papers and other literature on all aspects of OER should be generated. The current project can be regarded as a pilot of this. In order to integrate with the elite researchers, an International Steering Group of eminent researchers should be set up to advise on this.

50. *Guide to good practice*: A study team should be assembled from a number of institutions and involving external examiners to produce a *practical* guide for students, staff and external

examiners to cover the issues raised by study – and citation – of OER materials including, but not only, Wikipedia and podcasting.

51. In addition to research proposals, the following recommendations are made on policy and practice:

    - *Institutions should pay more attention to student views and experience of OER and online resources*: quality and benchmarking schemes and associated survey instruments can easily be updated to accommodate a greater focus on content.
    - *Institutions should consider together with their external examiners how best to foster judicious use of resources (including OER) by students*: especially in their project and dissertation work.
    - *In course redesign, institutions should aim to make more use of OER* and externally provided free-of-charge, non-open resources (e.g. via JISC repositories) in future programmes.
    - *Institutions should ensure when providing public information about their courses that issues of study time and contact hours for courses do not get trapped into a classroom-based narrative* that does not provide a realistic description of the learner experience.

Section 6.3: Mendeley

52. Our project has provided a detailed critique of Mendeley (section 6.3.1), but still feels it has value in supporting this kind of activity.

53. Our main recommendation is that there should be a 'proper trial' of Mendeley over a longer period (at least one year) so that there is time to see whether it can support a larger and more collaborative project than this one, and so that the community features of Mendeley can be systematically evaluated. This trial should be done with the full knowledge of the Mendeley company and an enhanced level of support.

54. Given earlier observations, we further recommend that the natural topic for the collaborative project is to construct a comprehensive structured and tagged database of literature references in English in the area of OER. (Earlier estimates suggest that there are up to 4,000 'scholarly' references[3] and up to 2,000 relevant ones in the grey literature.)

A note on curation

55. The funders of this project need to give due attention to the curation issues associated with the databases of literature produced by this project so that future relevant projects can make use of, update and further develop the resources. (All too often, new bibliographies start essentially from scratch.)

[3] A narrower search on *journals* on EBSCOhost specifically for 'open educational resources' produced 600 hits – as against 4,300 for 'Learning Management System'.

1. Introduction

1.1 Aims and objectives of the review

The Invitation to Tender describes the aims as follows (paragraph 2):

> *The purpose of the study is to provide a greater understanding of the ways in which learners, whether or not in formal education, use online resources to aid their learning experiences and the factors which influence the selection of resources. The resultant synthesis will provide the basis for additional work being commissioned by the HEA and JISC to examine the potential contribution open educational resources can make to the student learning experience. It is anticipated that collectively this work will enable practitioners, policy makers and researchers to adopt more effective evidence-informed or research-informed approaches to their decision-making, research and practice on matters relating to the use of open-educational resources in learning and teaching.*
>
> *The review is to be completed by/deadline for submission of final deliverables is 30 June 2011 (later changed by agreement to 1 July 2011 – the Friday of that week).*

The wider context is noted in paragraph 8 (footnotes omitted):

> *We wish to commission this study to support our ongoing work around open educational resources. This primarily relates to the OER pilot programme, completed in April 2010, and the OER phase 2 programme which began in August 2010. There are also a number of related activities such as the JISC RePRODUCE programme and the 'Good Intentions' report.*

It should be noted that at the time of writing this report, very little is known about the outcomes of any Phase 2 projects.

Summarising paragraphs 10-13:

> *(10) The review will offer a clear and coherent analysis of learners' use of online resources based on the literature. Typically, this will involve reviewing a wide range of existing publications, reports, papers, case studies, websites and/or datasets, together with relevant outputs from the HEA/JISC Open Educational Resources programme including: OER case studies, tracking reports, the Evaluation and Synthesis project, phase 1 and phase 2, and the phase 2 impact of OER use on learning and teaching research study ... This review will also include literature from outside of the UK HE sector.*
>
> *There is a large body of literature on the discovery of online resources, the selection and evaluation of resources for teaching and learning, and ways of using resources for academic purposes. Possibly less is known about learners' unmediated use of the web, the sorts of resources they seek, and the way they use them.*
>
> *For the purposes of this review, a learner may be any age, within formal or informal education, making use of online resources specifically for learning ...*

> *The aim of this literature review is to extract the findings that relate to learners' use of online resources* ***to aid their learning****.* [our emphasis]

Paragraph 14 describes the area of interest for the research (our numbering):

1. *Learners' rationale for searching for online resources;*
2. *Types of online resources being sought e.g. journal articles, multimedia;*
3. *Complexity/granularity of resources being sought;*
4. *How resources found are used e.g. for revision purposes, as evidence for assessment purposes, to enhance understanding;*
5. *Whether learners in some subject areas appear to conduct more searches for online resources than others;*
6. *Educational level of resources being sought e.g. HE undergraduate level 1, postgraduate;*
7. *Location of resources most likely to be used e.g. UK HE, international, non-HE;*
8. *Extent to which resources are the principal or a supplementary source of learning materials;*
9. *Whether or not learners are in formal education;*
10. *Enablers and barriers to use of online resources;*
11. *How learners retain access to the resources: downloading copies, bookmarking, 'favouriting' etc.;*
12. *Provenance information and copyright status of resources being used and learners' awareness of this.*

Paragraph 16 describes the outputs:

- *A literature review, to contain an executive summary; outline of methodological approach; identification, selection and analysis of the literature; conceptual perspectives; findings; conclusions, implications and recommendations; references ...*
- *A database of literature which is relevant to the review topic and which can be made available by the HEA and JISC to the sector as a searchable resource to facilitate the identification of literature by researchers and practitioners in the future.*

The 'literature review' is this report, complete with a full set of over 290 related references, including each one of the JISC/HEA OER Programme Phase 1 project reports (all of which were analysed again).

The 'database of literature' was, by agreement with the HEA and JISC, developed in the Mendeley research management tool and the final version will be available online via Mendeley[4] and via the project wiki[5].

The team

The team delivering this project was led by Paul Bacsich, Senior Consultant at Sero and also Visiting Professor at Middlesex University. He was ably assisted by Barry Phillips, who led on OER aspects, and by Sara Frank Bristow, who played a key role in the overall searches and construction of the Mendeley database and led on the non-OER aspects. The final report was written by Paul Bacsich with support in section 5 from his two colleagues. Additional assistance was provided by Giles Pepler in relation to ELESIG liaison and Nick Jeans in relation to additional international research on OER. Our critical friend was Professor Terry Mayes.

It would be a long job to name all in the wider circles who provided advice in the last few months but credit should go to Terry Anderson, Grainne Conole, Norm Friesen, Andreas Hedren, Jill Jameson, David Kernohan, Lou McGill, Judith Murray, Brian Naicker, Ebba Ossiannilsson, George Roberts, Robert Schuwer, Bieke Schreurs and Amber Thomas. Some of these gave us useful background on their use (or non-use) of Mendeley. Thanks should also go to Sebastian Arcq of Mendeley who fielded our early comments on the system.

1.2 Background to the review topic

We have not been given any specific background to the review topic but from our related researches on virtual institutions (Re.ViCa, VISCED, e-World, etc.[6]) and policy issues for OER (POERUP[7]) we had already identified two gaps in the OER literature: the student experience of OER and the national policy aspects of OER. (Recent information is that there may be another research gap – in learner-generated content[8] – but we have judged that aspect out of scope for this project even though a number of items were found[9].)

The timing of this project is not perfect in an ideal world, as our conclusions come too soon to incorporate learner-focused outputs from the OER Programme Phase 2 projects[10]. In particular the projects in Activity Area B (the use of OER) seem of particular relevance:

1. Bi: An investigation into the use of OER in UK higher education;
2. Bii: The collection of case study data around the use of OER in English higher education;
3. Biii: The tracking of the use of materials released by pilot phase projects.

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[4] See the Mendeley groups http://www.mendeley.com/groups/1074991/learner-use-of-oer/papers/ and http://www.mendeley.com/groups/1098021/learner-use-of-non-oer-online-resources/papers/.
[5] http://luoerl.referata.com/wiki/LUOERL
[6] http://www.virtualcampuses.eu and http://www.virtualschoolsandcolleges.eu (currently the same page)
[7] http://poerup.referata.com
[8] There is a work-in-progress bibliography at http://www.mendeley.com/groups/1216571/learner-generated-content/papers/.
[9] See the 19 items at http://www.mendeley.com/groups/1216571/learner-generated-content/papers/.
[10] http://www.heacademy.ac.uk/ourwork/teachingandlearning/oer/phase2

However, since the bibliographic output from our project is available online in editable form (Mendeley) as well as non-editable form (wiki and Word formats) it should not be very difficult for a small future study to update this project report to incorporate the learner aspects of Activity Area B outputs.

2. Outline of methodological approach

The methodology we intended to use was described in our Tender document, edited for public consumption on our project wiki and updated at the end of May in our interim report (Appendix 2 to this report).

In summary we proposed the following:

> *... [the] considerable body of work produced as a result of the HEA/JISC Open Educational Resources programme ... will form one of the two key starting points for the desk-research. In addition, the ... researchers engaged have previously undertaken research in the fields of OER, learner voice, learner-created content, Personal Learning Environments and the changing shape of learners' behaviours with regards to digital media. They will revisit this recent work (2009 and 2010) to mine the existing bibliographies compiled for those studies.*
>
> *In parallel with this, the researchers will canvass their network of experts from across all sectors of education (academics, researchers, practitioners, policy makers, industry etc.) who have previously helped inform our research in this area, and will collate a list of any key additional and newer studies*[11]*.*
>
> *The third strand of the 'traditional' desk-based literature review will be a straightforward broad sweep of OER publications where the definition will be sufficiently broad to encompass appropriate academic studies (and/or datasets) concerning the UK cultural-sector digital resource programmes and so- called 'non-educational' approaches such as YouTube and Flickr which are now said by some to have significant educational impact.*
>
> *However, as the OECD notes, OER is still in its relative infancy and the study of learner experience (as articulated, or reported, by the learner) newer still. In order to ensure the currency of our sources ... we shall undertake a thorough search of the 'grey literature' (conference presentations, blogs, wikis, forums, etc.) which will not only help to bridge the inevitable time gap between research and publication but will also inform us of upcoming research activities and publications – and perhaps newer actors in the field. This will be particularly valuable for the school sector which is less rich than post-16 in terms of recent research into OER. We anticipate that educational forums (largely those of practitioners) will provide a vital source of information regarding the position in schools.*

[11] Especially for Re.ViCa and CAPITAL and in the preparation and start-up for POERUP, the team have a wide range of contacts with experts (in e-learning generally and OER in particular) in many countries.

In more operational terms this came down by mid-May to the following:

- Literature search for relevant articles in journals etc. across bibliographic databases – both UK and non-UK literature. The main service used was EBSCOhost, which incorporates ERIC (Education Resources Information Center), the world's largest digital library of education literature, Education Research Complete, which provides indexing and abstracts for more than 2,100 journals (as well as full text for more than 1,200 journals), and LISTA (Library, Information Science & Technology Abstracts), which indexes more than 700 journals plus books, research reports and proceedings.

- Review of 'grey' literature including OER-relevant blogs, and detailed reading of all OER Phase 1 reports and analyses, to tease out in detail what was revealed about student attitudes and behaviour. We looked at 49 institutional project final reports, overarching programme reports, JISCInfonet, various bloggers associated with the JISC/HEA OER Programme plus other key blogs and wikis (Downes etc.), Elluminate OER presentations, other UK-based OER projects (notably OU OpenLearn), and the JIME OER special issue.

- Analysis of key bibliographies and reference lists, e.g. from OER reports, peer-reviewed journal articles and project websites; this was performed as a 'cross-check' mechanism as, in theory, anything that arose at this phase should already have been identified by another process (in some cases, however, this did yield some more obscure yet highly pertinent publications).

- 'Horizon scan' aspects including building (or attempting to build) a project community on Mendeley and links to ELESIG, EU projects (including the STELLAR network), Twitter streams, listservs and international OER activities (UNESCO, ICDE, OPAL, OER Foundation etc.).

Mendeley

The requirement that was not originally foreseen in our bid was to use Mendeley – this was requested by the HEA and JISC presumably (in line with policy trends) to ensure ongoing transparency of process within a social networking paradigm as well as an increasing use of free/open source software (FOSS).

Left to our own devices and as indicated in our Tender we would probably have used EndNote for collection, Excel for internal indexing, Word for the final report (and maybe intermediate results) and an Access-driven website or wiki for final display.

The use of Mendeley proved to be a very challenging exercise and raises a number of issues both about the current functionality/reliability of the software and the assumptions made about how it can be used. From time to time Mendeley issues threatened to 'become' the project or to seriously affect the quality of project outcomes, but we managed to overcome the issues and bugs that occurred. The final databases are available in Mendeley and there is a public audit trail of the processes that generated these databases. In addition, several other new Mendeley databases of literature are now ongoing.

2.1 Defining the review topic

The title of the project, 'A review of how learners make use of online resources to support their learning', was conveniently clear (which is not by any means always the case) and helpful in keeping the scope of learner activities to *learning*, rather than social purposes, career-building, etc.

The surrounding brief made it clear that 'learner' was to be interpreted broadly across all categories of educational provider, so that we did not have the usual issues of distinguishing 'school' from 'college' and 'college' from 'university-level institution', which have bedevilled other projects of more restricted scope, even in the UK, let alone other countries where the boundaries are subtly different[12]. In the end, the nature of the OER projects, the dominance of UK and US players in OER initiatives, and the concentration of research activity in institutions made it perhaps inevitable that there was a concentration (of the literature, not us) on learners in higher education.

Contrary to the situation with some other topics (e-learning, virtual schools, etc.) we did not find any great difficulty with the meaning of 'open educational resources' as judged against the literature (as we took a broadly inclusive definition). Much harder was to determine the scope of 'online resources' (beyond OER) and to ensure that we did not collect material that went into learner use of *systems* not *resources* – as many papers did or wanted to do.

We tried to ensure that we collected material from or about any developed country – provided that the material was in English. Initially we did have theories about which countries were priorities:

> *Such countries include Australia, Canada, New Zealand, US, Sweden, South Africa and Netherlands.*

However, in the end we aimed to collect relevant material from any reasonably advanced country (high-income and upper-middle-income in World Bank terms[13]), but the overwhelming majority came from US and UK sources. However, reports (in English) from Brazil, Taiwan, India, Denmark and various other countries turned up in our database.

We also were as usual alert to linguistic issues:

> *Since the success of OER (as with Wikipedia) is likely to be closely correlated with the number of language speakers (native and second language) it behoves us to look also at the two other European languages of world relevance, namely French and Spanish.*
>
> *It is not commonly known that several nationalities do not use the phrase OER – for example in French they use the phrase Ressources Educatives Libres (REL). Similar issues arise in Spanish. Failure to understand such issues can seriously affect the quality of web searching.*

[12] We are having an interesting debate in another project with Swedish researchers on how to map 'yrkeshögskoleutbildning' into the UK context – http://www.studyinsweden.se/How-To-Apply/Higher-Vocational-Education/.

[13] http://www.virtualcampuses.eu/index.php/All_countries_by_income

However, apart from requesting our consortium partners in EU projects to provide information on OER in their countries, and some limited checking of OER country reports on WikiEducator[14], we did not have the resources to undertake systematic journal searches in other languages. We did form an impression from our limited searches and discussions that with the exception of the Netherlands, and to some extent Sweden, there was little locked away behind linguistic firewalls (at least for European languages) – which are by far the most likely to interpenetrate with UK research – via EU and other international projects and collaborations. (This is confirmed, to some extent, by a search via Google scholar, which returned just 16 hits for the French phrase – yet 285 for the Spanish – which of course is the language of Latin America as well as Spain[15].) It would be likely to require a full EU study to be sure.

2.2 Methodology used

The methodology used had both breadth and depth, as appropriate. In the case of the JISC/HEA OER and related material, what was required was to reread in depth the relatively small number of reports to glean the fragments of learner-related material in reports whose prime purpose was not in that area. In the case of the wider mass of journal and conference papers on OER and non-OER online resources, the aim was to capture, annotate, categorise ('tag' in Mendeley terms) and then rank material (by relevance to project goals).

A guiding principle was that when we captured material (because it looked promising) we did not throw it away, but might move it to an OER group outside our project scope or rank it (initially, at any rate) at level 1 to signify effectively 'collected in error'. To use this seemed consistent with the guiding spirit of Mendeley where one is collecting material not only for oneself or one's project but for the community – what to us is not useful might to others be very useful, and once it is in Mendeley it is much easier for others to find.

Our ranking system evolved over time but was based on a five-point system:

1. somewhat related;
2. related;
3. relevant;
4. very relevant;
5. most relevant.

[14] It is indicative but not definitive that http://wikieducator.org/France and http://wikieducator.org/Spain are largely content-free. Commonwealth countries are more active than theory might suggest – see e.g. http://wikieducator.org/India – because of the strong influence of the Commonwealth of Learning (http://www.col.org/blog/Lists/Posts/Post.aspx?ID=140).

[15] See http://scholar.google.co.uk/scholar?hl=en&q=%22Ressources+Educatives+Libres+%22&btnG=Search&lr=lang_en|lang_fr|lang_es&as_sdt=1%2C5&as_ylo=&as_vis=0 and http://scholar.google.co.uk/scholar?q=%22Recursos+Educativos+Abiertos%22&hl=en&btnG=Search&lr=lang_en|lang_fr|lang_es&as_sdt=1%2C5.

For most of the project these numbers were used as tags – i.e. '1' etc. However, in the period of the project a bug seemed to appear in the operational Mendeley desktop client, which meant one could not search therein on single-digit numeric tags. Consequently late in June we had to spend effort changing all these tags to 'L1' to 'L5'.

Tag L1 initially meant that the item was not to occur in the final bibliography but late in the project was reinterpreted to mean 'seems related but is not very much'. Those former L1 entries that did not pass even this threshold were moved into the LUOERL community group.

A different scheme was used for JISC/HEA OER project reports (and the associated funded analyses) – J1 to J5 – because our feeling was that HEA and JISC would want every JISC/HEA OER report (even J1 reports) to be in the database, even if irrelevant for our specific purposes. It was also useful to separately tag reports from the JISC/HEA OER programme.

The ranking system L1-L5 also initially had an operational interpretation and was useful for prioritising analysis, but in the end almost every item had its abstract analysed:

1. somewhat related;
2. related = someone should skim the abstract (some are quite long);
3. relevant = someone should read the whole abstract;
4. very relevant = someone should read the abstract and skim the whole report (if available);
5. most relevant = someone should read the whole report (if available).

As a final step, for the very small number of items whose full text was not available to us (despite comprehensive library access), we (regretfully) applied the tag 'restricted-access' so that these might at least be included in the bibliography even if not formally ranked.

Mendeley

The material below is taken directly from the Mendeley FAQs:

> *Mendeley is a combination of a desktop application and a website which helps you manage, share and discover both content and contacts in research.*
>
> *Our software, Mendeley Desktop, offers you:*
>
> - *Automatic extraction of document details (authors, title, journal etc.) from academic papers into a library database, which saves you a lot of manual typing! As more people use Mendeley, the quality of the data extraction improves.*
> - *Super-efficient management of your papers: 'Live' full-text search across all your papers – the results start to appear as you type! Mendeley Desktop also lets you filter your library by authors, journals or keywords. You can also use document collections, notes and tags to organize your knowledge, and export the document details in different citation styles.*

- *Sharing and synchronisation of your library (or parts of it) with selected colleagues. This is perfect for jointly managing all the papers in your lab!*
- *More great features ...*

Our website, Mendeley Web, complements Mendeley Desktop by offering you these features:

- *An online back up of your library: Store your documents in your account and access them from anywhere through your browser.*
- *Detailed statistics of all things interesting: You can upload your own publications to your research profiles, then track the evolution of your readership ... Additionally, there are detailed statistics for each academic discipline and research topic ... What are the most widely read papers on a specific subject?*
- *A research network that allows you to keep track of your colleagues' publications, conference participations, awards etc., and helps you discover people with research interests similar to yours.*
- *A recommendation engine for papers that might interest you, but are not yet in your library! Based on what you know already, what should you read next?*

After much experimentation we set up a number of Mendeley groups to support our project, described below using their current names:

1. A group on *Learner Use of OER* for the team to collect and analyse the journal articles and other items on this topic – http://www.mendeley.com/groups/1074991/learner-use-of-oer/. This is a group with membership restricted to the team but which anyone else interested could 'follow' (but not edit).
2. A companion group on *Learner Use of non-OER Online Resources*, with similar features – http://www.mendeley.com/groups/1098021/learner-use-of-non-oer-online-resources/.
3. A community group on Mendeley now called *Learner Use of Online and OER for Learning (LUOERL) – the community* (earlier called by the obscure name *LUOERL for the community*) – http://www.mendeley.com/groups/1102391/learner-use-of-online-and-oer-for-learning-luoerl-the-community/. This is a group oriented to discussion and populated by documents it was hoped might generate discussion. (It now also holds a number of papers that did not fit elsewhere.) This is a group which anyone can apply to join as a full member[16].
4. Two other Mendeley groups were set up to ensure that no potentially relevant (especially an OER-relevant) resource was thrown away – the motto being 'capture first, analyse later'.

[16] This raises potential security issues but the papers in this group are copied from other groups and therefore it is not a problem if a user outside the team were to accidentally or deliberately delete them or amend their entry.

These groups correspond to the key non-learner stakeholders in OER – academic/institution and national ministry/agency. The groups are *Staff and institution aspects of OER* (the name was recently changed and the group made more visible – http://www.mendeley.com/groups/1223261/staff-and-institution-aspects-of-oer/) and *National Policies for OER Uptake* (http://www.mendeley.com/groups/1075011/national-policies-for-oer-uptake/).

There were also two (but only two) existing OER-related groups on Mendeley set up before we started the project:

- *Open Educational Resources (OER)* – http://www.mendeley.com/groups/1003421/open-educational-resources-oer/;
- OER OpenEd business models – http://www.mendeley.com/groups/813911/oer-opened-business-models/.

The second seems to be related to an EU project – but contains no papers. The first was set up by someone unknown to our team and seemingly not well known in OER circles. We did consider using this in a way more central to our project, but since it is owned by someone not on the team we have no control over who might add, delete or modify entries on papers. Thus we decided to join it and to contribute material only – in fact *all* the papers it contains have been contributed by our team.

Horizon scanning

A number of tasks were done:

- A search was done of Mendeley for 'open educational resources' and relevant papers were added. No other OER-related bibliography was found that was online and in an importable form. (Reference management systems cannot yet meaningfully import references from bibliographies in PDF or Word – Mendeley is not alone in having that restriction.)
- The team checked in detail all resources on ELESIG and set up a group, which one of us contributes to and monitors from time to time – *Learner Use of Online Resources for Learning* (http://elesig.ning.com/group/learneruseofonlineresourcesforlearning). Nothing particularly useful has come back from that channel but it does now have 11 members and will be a useful dissemination channel. A useful bibliography of international student use of resources was found on ELESIG and the relevant references incorporated.
- Contact was made with the STELLAR network and one of the team joined it, making a blog posting and searching the STELLAR database of experts and papers for references to OER. A few relevant results were found.
- All partners in VISCED and other consortia and joint programmes were emailed to ask them for relevant OER journal articles and reports from their country. We had particularly helpful replies from our Danish and Swedish colleagues. (Our Danish partner in VISCED includes the expert who wrote the main Danish OER study, and via benchmarking links we are in contact with the main Swedish project in the area.)

- The usual listservs, blogs and Twitter streams were monitored, together with emails from all our usual contacts via projects and collaborations. Most blog postings tend not to be too analytic in this area but the occasional one, as recently from Tony Bates, is relevant and generated heated yet evidenced discussion[17].

Social networking

A dissemination wiki was set up (http://luoerl.referata.com/wiki/Main_Page) at project start. At the time of writing, the Main Page has been accessed 278 times and the various content pages accessed between 30 and 90 times depending on which page. A few people are looking at it, but not many.

There is a project page on the Sero website (http://www.sero.co.uk/showcase-luoerl.html) linked to the Sero main page.

Social networking via Mendeley is discussed in section 2.5.

2.3 Justification of method

The natural approach for literature search projects over many years, and still prevalent at least in the field of e-learning and in several recent projects, seems to be (in oversimplified form) for one person (the 'RA') to sift the various databases and produce a short list of references, usually with the key ones annotated, for the team leader (the 'professor') to read and then write the report, with the RA 'sorting out the bibliography'. (Indeed, the individualistic nature of much bibliography creation in some disciplines seems to be one of the reasons why collaborative reference management systems like Mendeley have as yet little traction in e-learning.)

Because of the short timescale (two months) and existing corpus of UK material, we wanted a more parallel-running approach, with two researchers looking into the data. Based on their skills and existing competences, it was thought best by us for one researcher (Barry) to concentrate on a deep analysis of the current JISC/HEA OER material (in order to tease out the elusive fragments of material on learner views and behaviour) with the other (Sara) to do the wide-ranging searches. The team leader (Paul) was to take on the horizon scan and mobilisation of human resource to generate leads to noteworthy papers as well as do the final writing including analysis of the most key reports, with Barry assisting in this process.

We would have done this with or without Mendeley, but the use of Mendeley encouraged a more collaborative approach.

2.4 Other methods considered

As stated in the last section, we would not have used the traditional centralised approach anyway because the project was too fast-moving and it did not make the best use of the skill sets of the team.

[17] For an overview see http://danielschristian.com/learning-ecosystems/2011/03/21/the-oer-discussiondebate-over-at-tony-bates-blog/.

In relation to technology, we did not initially propose to use Mendeley. As in our similar projects in the past, there would have been much more use of manual techniques to produce initial reference lists, probably with a bookmark manager (even if only inbuilt browser facilities), then Word to hold an annotated bibliography and Excel to maintain the database of references and use as the basis for publishing them online (via an Access-driven website or wiki, most likely – but that part would have depended on conversations with the HEA – e.g. about EvidenceNet – and with JISC).

In a longer-running project (such as in our past EU projects) we might have considered the use of a wiki – but it was clear that this was not an efficient use of resources in such a short project, especially since on other projects we are just starting our development path into systematic use of semantic wikis.

The wider social networking (to charm key papers out of people) would have been carried out by ELESIG, Twitter, Facebook, LinkedIn and copious emails mainly from Paul to his collaborators and contacts.

2.5 Reflections on the methodology

Research methodology

There was an unequal split between the demands of the deep analysis of the (relatively) few JISC/HEA OER reports and the wide but shallow first pass through the general literature – which is why Barry later in the project moved to assist with the detailed analysis of key papers.

We discussed several times whether it was wise to split the collection of papers into two groups – OER and non-OER – but at the end we felt that the gravitational pull of the OER community is so strong that conformance (in part) with their mindset was essential.

Social networking

Our attempt to foster social networking among researchers via the Mendeley group *Learner Use of Online and OER for Learning (LUOERL) – the community* was *not successful* in the time frame of the project (just two months). Despite announcements in various public fora, all the postings and papers uploaded were from the project team and nobody else. On the other hand, our experience in other projects suggests that a year or more – and much effort – is required to foster such social networking. The Mendeley group does contain four external (non-project) members, some of considerable eminence in OER, so that the project is getting a level of external scrutiny.

It is noteworthy that the 'default' OER group (set up before our project started) does have 18 members and seven followers, with followers joining almost daily up until the end of the project. To us this establishes that there is a 'hunger' for information – yet none of these followers ever posts a comment or submits information. They are like bees round a honey pot, but never contribute any honey[18]. One is reminded of the 'Tragedy of the Commons'[19].

[18] Nectar, to be more precise.

[19] http://en.wikipedia.org/wiki/Tragedy_of_the_commons

One the other hand, 'ownership' of the 'best' name seems to be key. So, after the project ends, we shall consider with our sponsors what further steps to take in Mendeley and with whom. It will be important to bear in mind the curation issues of these databases – an issue not dissimilar from that of wikis after projects finish and thus one with which we are familiar.

We have also raised this issue with a number of other e-learning experts who use Mendeley. It is only a small sample but the general feeling seems to be that Mendeley is not compelling enough for social networking, even among researchers – Facebook, LinkedIn and (for academics) academia.edu seem to fulfil their needs.

Mendeley

In the interim report we gave an account of the many issues we had with Mendeley. This is updated and provided in a short appendix. We had additional issues in the last month including a serious issue with searching on tags – fundamental to such systems. As we stated before there is not the effort in this project to provide a full critique of Mendeley.

We might not have used Mendeley if we had known when we started this project how buggy, poorly documented and limited it is in its current version, and how unforgiving it is of 'doing things the wrong way'. On the other hand, we are glad (now – we think) that we have used Mendeley and now have a much better idea of how to use it well.

It is a system with a steep learning curve and the documentation is still very limited. We would not recommend it at this point in its development as a system for other projects to use unless they have substantial prior experience of it – or have the necessary resources (including time) to devote to becoming familiar with its effective use.

Paul had to take over support and piloting of Mendeley – which did absorb a lot of effort, most of which we could not charge to this particular project. This also detracted from the more conventional social networking that might otherwise have been done with the OER community – most of whom are not active users of Mendeley. Now that we have gained experience of Mendeley, Sero in general and Paul in particular are routinely using Mendeley for other projects and we are confident that it can support the collaborative creation of large databases of literature. As examples, by the end of June groups have been set up for:

1. Virtual Schools and Colleges (182 entries – and interestingly about half were imported directly from the Mendeley central database of papers, proving that Mendeley has the potential long-term to be the 'Wikipedia of literature references'). This has been set up to support the EU VISCED project – http://www.mendeley.com/groups/1075201/virtual-schools-and-colleges/.

2. Benchmarking e-Learning (32 documents – http://www.mendeley.com/groups/1075191/benchmarking-e-learning/) and also Quality of e-learning (http://www.mendeley.com/groups/1087051/quality-of-e-learning/), set up to support collaborative projects including a book chapter on research issues in quality of e-learning. Both these groups have key international members.

These groups (and others less visible) also allowed piloting of ideas (especially on tagging) that were not charged to this project.

Paul is also encouraging other developments, e.g. for MELSIG[20], but it is early days. As stated earlier, community building is a slow process.

One key conclusion is that it seems to us now feasible to generate a *complete database of OER literature references* (most likely around 3,000 core items, but up to 6,000 items in English if broadly interpreted) in Mendeley. This would not be monolithic but split down into groups, perhaps along the lines of the ones we have used, but also taking into account other perspectives such as those of CETIS, the OTTER project and some EU projects such as OPAL and CONCEDE[21].

One final note on costs: Mendeley is not free – though it is relatively cheap – with costs rather similar to wiki hosting costs. Even for the relatively modest needs of one team in one small consultancy company, the team leader is already on the *Milky Way* price band of £9.99 per month, for:

- 15 GB web space;
- 7.5 GB personal space;
- 7.5 GB shared space;
- 25 private groups (these include public invite-only groups);
- 20 users per private group.

General considerations suggest that for a large JISC collaborative project or medium-sized EU project, this kind of scale is necessary.

Beyond this scale there are indicative price guidelines, based on a 'per month per user' cost, but these are not public.

3. Identification, selection and analysis of the literature

3.1 Method of selection for inclusion

3.1.1 JISC/HEA OER material

Every project report and meta-analysis was read in great detail. See section 5.1 for more detail on our findings.

3.1.2 Learner Use of OER (other than JISC/HEA OER material) and Learner Use of non-OER Online Resources

The search methodology for this category of literature proceeded as follows:

[20] http://ppp.chester.ac.uk
[21] http://opal.innovationpros.net and http://www.concede.cc

1. Four days of comprehensive research using the federated EBSCOhost suite of online research databases[22]. EBSCOhost searches across multiple databases simultaneously, including ERIC (Education Resources Information Center), the world's largest digital library of education literature, Education Research Complete, which provides indexing and abstracts for more than 2,100 journals (as well as full text for more than 1,200 journals), and LISTA (Library, Information Science & Technology Abstracts), which indexes more than 700 journals plus books, research reports and proceedings[23].

2. Two days of keyword research using Summon, a federated Google-like 'unified discovery service' and library tool that searches both the EBSCOhost suite and other.edu library resources[24]. Supplementary searches were performed by author and subject.

3. One day spent independently reviewing dozens of relevant reference lists/bibliographies on an item-by-item basis. Where research has led us out of the realm of peer-reviewed articles, we have followed, since – given the self-referential nature of this particular topic – authors will frequently self-publish in untraditional media such as websites, blogs, wikis, and uploaded presentations or videos. A modicum of targeted Google searching was performed, but this largely confirmed that the prior research was indeed comprehensive (for a project of very limited duration).

In addition to this work, colleagues added a number of additional papers found from various sources.

Keywords

When using the search tools named above, productive keyword search terms of note (when used in combination) included:

> OER; OERs; open educational resources; open educational; open resources; open content; education; digital textbooks; (university) digital library users; open/free digital textbooks; (digital) information-seeking behavio(u)r; information seeking; information behavio(u)r; digital information literacy; digital information behavio(u)r; information; research; online; online research; internet; internet research; e-books; e-textbooks; e-journals; student(s); learner(s); user(s); end users; use; student use; student experience; student perceptions; Wikipedia; google; merlot; iTunes U; RLO; RLOs; digital; digital library; digital/information literacy; impact; evidence; scaffolding; digital natives/immigrants; millennials

Numerous other terms yielded either isolated or sporadic results, or cast far too wide a net to be useful – e.g. into the deeper realms of library science and learner theory.

Once selected, abstracts were read (and in some cases full text skimmed, with particular attention paid to 'findings', 'discussion' and 'conclusion' sections) so that items could be ranked on a five-point scale of relevance to the project.

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[22] http://www.ebscohost.com
[23] http://www.eric.ed.gov and http://www.ebscohost.com/academic/education-research-complete
[24] http://www.serialssolutions.com/summon-research/

Further details are in section 5.2.

3.2 Method of analysis

This is described in sections 5.1, 5.2 and 5.3 for the various categories of literature.

3.3 Overview of included literature

The included literature comes in two groupings:

1. A Mendeley group *Learner Use of OER* with currently 138 entries – http://www.mendeley.com/groups/1074991/learner-use-of-oer/. This group can be regarded as having two subgroups:
    - A set of JISC/HEA OER project and related material, including all JISC/HEA OER Phase 1 project reports and meta-analyses – 36 in all, each marked as 'published in' JISC/HEA (or a JISC/HEA programme);
    - A set of around 80 other papers and items on learner use of OER.
2. A Mendeley group *Learner Use of Non-OER Online Resources* with currently 153 entries – http://www.mendeley.com/groups/1098021/learner-use-of-non-oer-online-resources/.

3.4 Explanation for excluded literature

A considerable amount of additional literature was collected in passing, in keeping with the Mendeley philosophy that collection of any item benefits the Mendeley community *overall*, even if the item turns out not to be relevant to a specific project. The five-point ranking system also allows us to set the bar at various levels depending on the size of bibliography required.

In the OER collection process, items that turned out on inspection not to be relevant to learner use normally ended up in the *Staff and institution aspects of OER* (57 papers at the time of writing), the main focus still on OER research generally, with a few ending up in *National Policies for OER uptake* – only 30 papers (at the time of writing) despite around half having been copied from an earlier search in this area[25]. Thus in a sense, very few papers were excluded if they had some plausibility – and these are still available for future projects.

In the non-OER area – where it is much harder to judge relevance – a considerable number (not tracked because it was outside the scope of the project) ended up in *Virtual Universities* or *Virtual Schools and Colleges.* Papers were excluded usually because there was no explicit mention of 'learner' (or 'student' etc.) in the title or the abstract. By and large, if there was a mention of 'user' in a context where it was reasonable to infer (even if wrongly) that 'learner' might be meant, it was collected, even if later it got a low rank[26].

[25] Some of these are at http://poerup.referata.com/wiki/Category:Publications, last updated 6 April 2011.

[26] Thus we have included at L1 some papers that others might imagine are relevant – even if we know now that they are not – to avoid criticism (even if uninformed) that we were not comprehensive! (One can do that in an area where there are

As noted earlier, one of the biggest issues with papers on OER was the ambiguity of the term 'user'. The main reason for giving seemingly relevant papers a low rank was that the statements in them about actual 'learners' (and their views, behaviours, etc.) were often based on academic theorising (even wishful thinking in some cases) or informal conversations with a few students rather than surveys, focus groups, learner analytics or similar evaluative tools.

In the non-OER area one of the biggest issues was that very few papers dealt with the learner use of *content*[27]. Researchers seem far more comfortable dealing with learner interactions with systems, other students or in some cases tutors. Content seems rather passé to researchers, as if constructivism had won when it clearly has not – and even less so at pre-tertiary level.

4. Conceptual perspectives

In this section we focus on OER issues.

4.1 Evidence of mapping of underlying conceptualisations

As said earlier, we did not find any particular difficulty emanating from the literature regarding what it meant by OER. It was probably useful that 'learner use' is a small and (so far) relatively uncontested part of the OER 'multiverse'. Thus when reviewing the TALL Mindmap it was obvious that the 'learner use' aspect is just a small spot of a big network[28].

Students seem to have a very operational view of OER as 'stuff I can access'.

The Mendeley system supports tagging in a way that we were familiar with from our wiki work. It may be that this kind of 'database' (tabular) system tends to be antipathetic to the Mindmap graphical approach, especially as the number of items to be represented rises into the hundreds. We also found again the phenomenon common in studies that take a grounded theory approach that the tagging scheme[29] evolves slowly over time as data flow in and as earlier data are reinterpreted. This was very familiar to us from our work on 'virtual campus' taxonomies in Re.ViCa[30], and we are going through the contortions again with 'virtual school' taxonomies in VISCED[31]. Both situations required over a year to refine and thus it feels unrealistic to expect major conceptual rethinking within a two-month project.

Nevertheless Mendeley makes some small attempt to represent the tags as a tag cloud (within the Groups section of the web interface); see Figure 1 below. Figure 1a) shows a close-up of the very top tags – Figure 1b) is the complete display.

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relatively few papers – the same would be true of costs, quality or benchmarking of e-learning.) This is a not untypical way of behaving in EU projects and others that have wide dissemination into different educational cultures.

[27] However, learner *selection* of content was much more easily researched.

[28] http://www.mindmeister.com/76726554/oer-use-reuse-landscape

[29] http://elearning.heacademy.ac.uk/wiki/index.php/Tagging

[30] http://www.virtualcampuses.eu/index.php/Virtual_campus

[31] For very early work on that see http://www.virtualcampuses.eu/index.php/Exemplar.

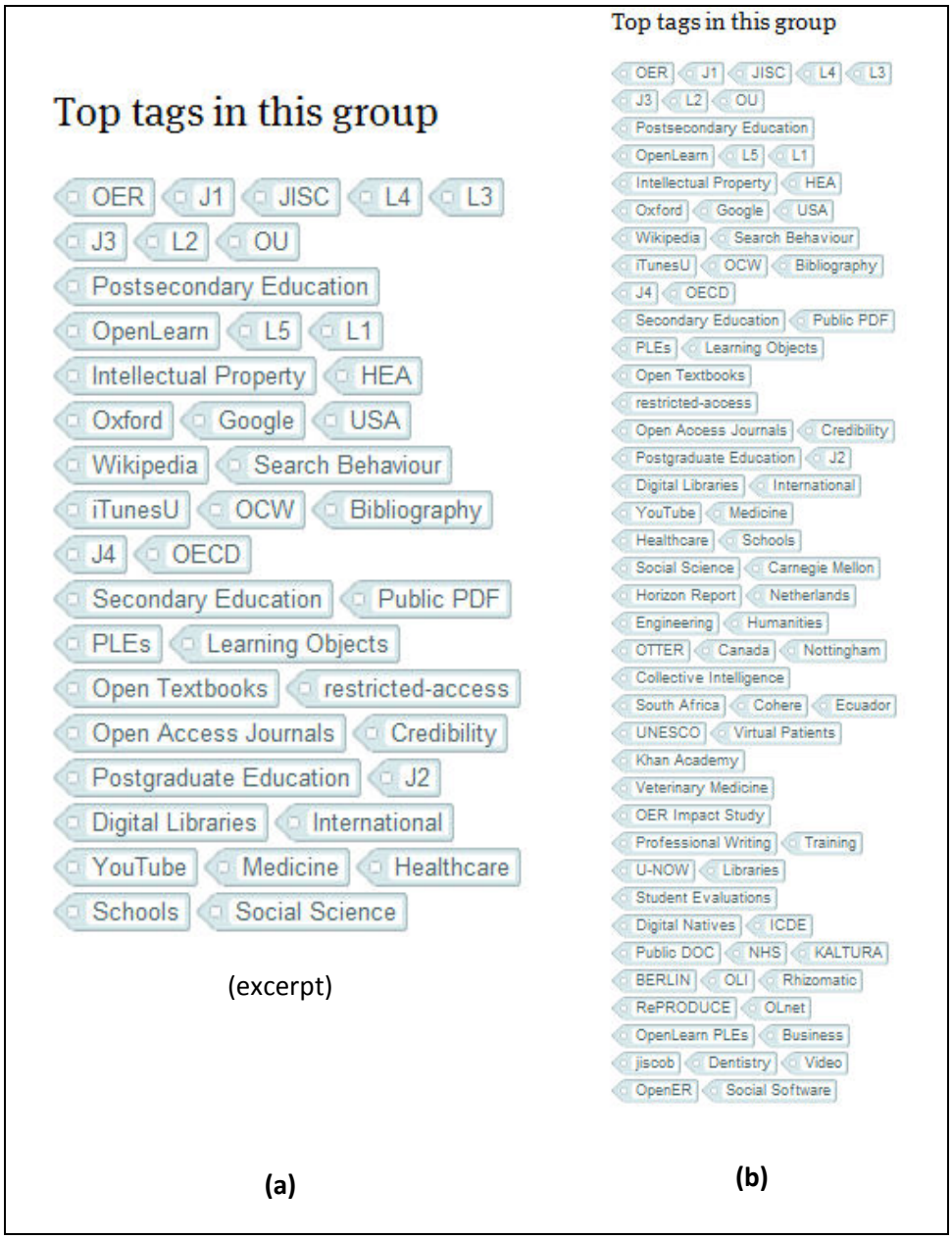

Figure 1: Tag cloud from Learner Use of OER group in Mendeley: 1a) offers a close-up of the top level of tags; 1b) represents the cloud as a whole

For completeness we include on the next page the similar cloud for non-OER (Figure 2). There you will see a number of significantly different tags that have no or much less exposure in the OER cloud, in particular digital libraries, millennials, and information literacy.

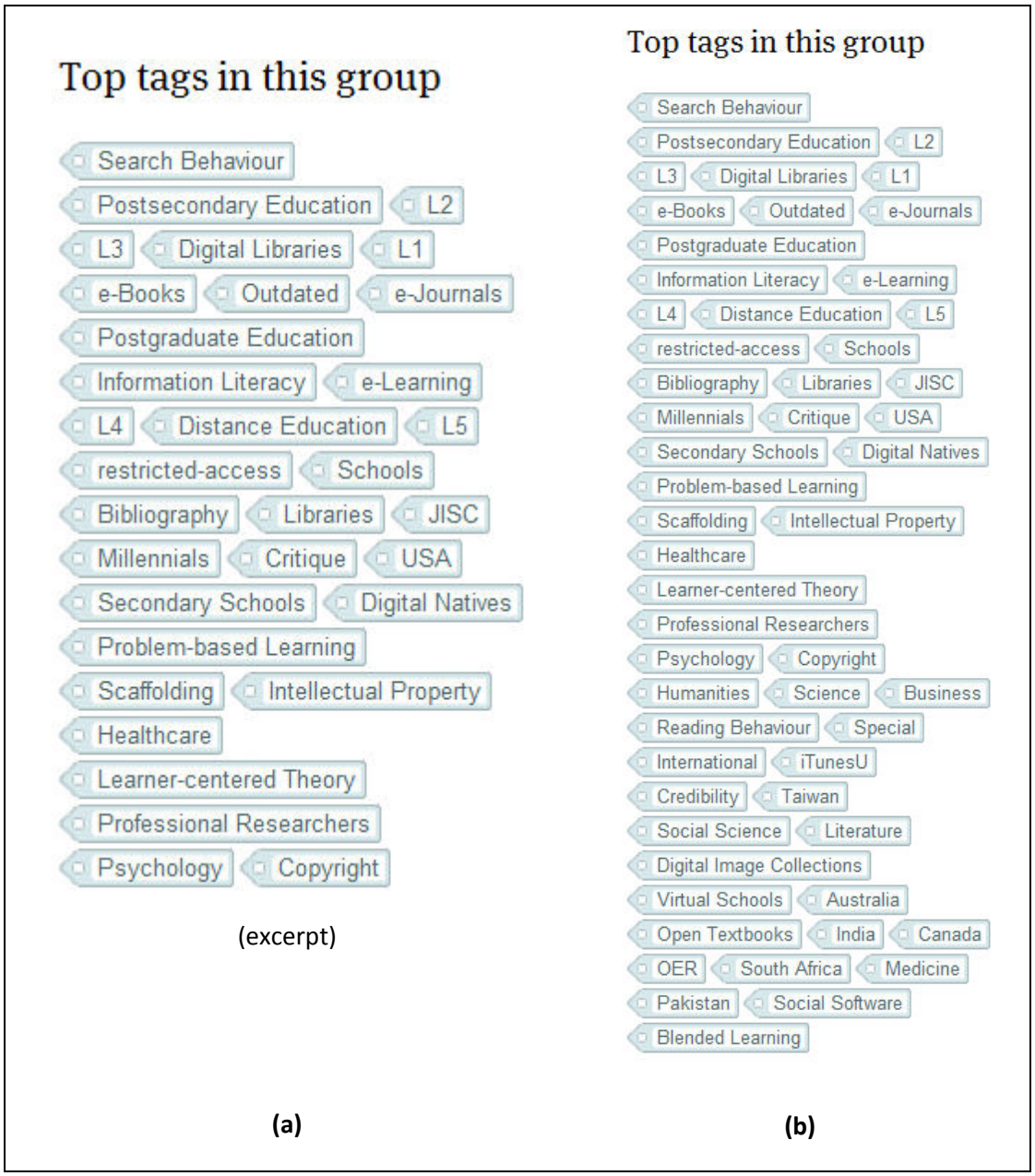

Figure 2: Tag cloud from Learner Use of Non-OER Online Resources group in Mendeley: 2a) offers a close-up of the top level of tags; 2b) represents the cloud as a whole.

4.2 Key contextual variables

By contextual variable we mean a variable in the environment surrounding the learner or a variable aspect of the learner known prior to their engagement with a mode of learning – such as age, sex, ethnicity, previous educational level, etc.

There is a fascinating study by KERIS that looks at contextual variables for *national* OER uptake[32]. However, we have found nothing else comparable and so we shall have to leave such national-level

[32] http://www.slideshare.net/OCWConsortium/analysis-of-the-contextual-factors-for-developing-national-oer-policy

issues in OER to another study – though we are attempting currently a similar but simpler analysis for the factors predisposing towards virtual schools in a country[33].

In relation to the contextual variables linked to the student, the ones that the literature has looked at include:

- previous educational level;
- subject wished to be studied;
- level of prior information literacy (along some dimension of 'digital native').

There are many examples of studies looking at these in section 5. However, and interestingly, we do not find many studies looking at age, sex, language (or language competence) or ethnicity, in the way one would find in many broader studies of ICT uptake – and would have found to an even greater extent even decades ago.

We can understand why in a survey of English-language research papers, there is little on language aspects. However, harder to understand is why we seemed to find no literature on how students in different countries perceive, search for, use and value OER. Linking back to the national contextual variables noted above, studied by KERIS and our prior work on virtual campuses (and ongoing for virtual schools), we have formed an increasingly firm view that while remaining believers in the discipline of comparative education, one has to be increasingly careful about drawing conclusions about ICT in one country from an apparently similar situation in another. In relation to universities, the global consensus on 'what is a university and how is it funded' (mostly by the state) is fraying fast. For example, the reasons why some countries have substantial distance learning provision from universities and others apparently similar do not, or have it organised very differently, are hard to fathom and exercised us for months in Re.ViCa.

If that is the case for universities, it is much more so the case for schools and colleges. The community college sector in the US, with its breadth of provision and richness in e-learning, is not replicated in many other countries.

Yet there still are countries that are similar enough to each other from which lessons can be learned – and sometimes they can be learned for the UK (or England) from one sector (arguably, schools in Sweden) when they do not apply to others (universities in Sweden – still with zero fees for EU students and a modularised credit transfer and loan system across the sector).

However, all this leads into a much more complex and longer-term study than the one we were commissioned to do.

4.3 Issues and methods embodied in the analysed literature

The commentaries on the analysed papers draw out comments on their issues and methods.

[33] http://www.virtualschoolsandcolleges.info/news/factors-predisposing-towards-virtual-schools-country

There is evidence (as noted in section 3.4 above and section 5.2 to follow) that, with the exception of studies on major projects such as OpenLearn and OCW,

> *Studies involving human subjects tend to focus on the experience of small clusters of 10-100 students (typically under 50); or broad swathes of users (upwards of 3,000). Data may be collected through a combination of interviews; surveys; observation; focus groups; assessment; metrics; user logs; emails; and other means.* ***There is little uniformity in methodology here, and so it is difficult to compare these studies and their results****.*

To us this clearly implies that future studies on OER in UK HE have to be both larger-scale and more systematised.

5. Findings

This chapter is divided into three parts:

1. A meta-analysis of all the JISC/HEA OER Programme Pilot Project reports and associated analyses.
2. Literature survey of learner use of OER (projects and papers other than those from the JISC/HEA OER Programme).
3. Literature survey of learner use of non-OER online resources.

5.1 A meta-analysis of all the JISC/HEA OER Programme Pilot Project reports and associated analyses, together with OpenLearn

See Appendix 1 for a list of the 29 OER Pilot projects. The JISC RePRODUCE project (with its 20 reports) was also looked at; each project's final report was placed in the bibliography and analysed in detail. In addition, the various reports from the JISC Support and Synthesis project were read. Finally, key reports from The Open University's OpenLearn project were analysed.

5.1.1 Research issues

Generally, across the 49 JISC/HEA OER Programme Pilot Projects and JISC RePRODUCE Projects it appears that there had been an initial intention to gather student feedback on the use of OERs, but this has rarely materialised (so far). There is then relatively little robust learner-oriented data available from these projects.

- It was often suggested that time and the relative immaturity of the projects had been barriers and deeper evaluation of student experience was intended for further phases. However, as yet we could find little evidence of ongoing activity.
- Where student feedback had been gathered it was (perhaps understandably) focused on the quality of the overall experience: Did students value the delivery methods? Did they value the content? This gives some useful (if not original) insights into 'online' or 'blended' learning but not into the openness or reusability aspects – on which students' views have, thus far, rarely been sought.

- A lack of consistency in terminology clouds some of the data – 'user' may mean student or lecturer. It may mean staff who produce then use, or staff who simply use. Similarly 'producers', 'depositors', 'creators' also means staff from whom the materials originate. Unless it is clear that the user/respondent is a student it has been impossible to draw conclusions.

In leading an online seminar that looked at these projects in the context of wider OER developments (January 2011) Helen Beetham said:

> *One of the frustrations of the pilot phase was ... that the projects felt that they really didn't know enough about the way their projects might be used and this is a huge design problem because we are used to hearing in educational design that it's all about designing for the end user. If you don't know who the end user might be that becomes a series of problems. On a broader scale the lack of understanding of whether OERs are being used at all, by whom and in what context – whether it's highly supported by the curriculum or whether it's in the wild ... that's something that we really don't have enough information about*[34].

Beetham and others involved in the JISC projects also noted the difficulties in tracking qualitative and quantitative use of OERs. Beetham cautioned that there is a need to "manage expectations" on this front.

There were, however, several notable exceptions among which were:

- the OTTER (Leicester) project, where 71 learners responded to a learner use survey;
- ChemistryFM (Lincoln), BERLiN (Nottingham) and OER ADM (Brighton), where students were involved in content creation;
- Open Space (University College Falmouth), where students were encouraged to collaborate and manipulate resources.

The relatively small-scale and short-term nature of these projects makes it difficult to draw clear and transferable conclusions (and the evidence is occasionally contradictory), but there are nonetheless some consistent themes arising that it would be unwise to dismiss without further enquiry. *Equally, it would be unwise to ignore the contradictions.*

5.1.2 The learners: skills, behaviours, and preferences

Even within the current 'traditional' HE student constituency there is a vast spectrum of competence and confidence. OER have the potential to contribute to the creation of offers that broaden the catchment even further – largely through increasing choice available to learners whether that is on cost, value or curriculum (or a combination of these). New students may be attracted from work-based environments or increasingly from new overseas constituencies. While this remains to be

[34] Helen Beetham from Elluminate session (2011) https://sas.elluminate.com/site/external/recording/playback/link/meeting.jnlp?suid=M.73C03453269CFD3F84F16CCF8C0322&sid=2009077. Last accessed 22 June 2011.

proven, some institutions reported a positive impact on attracting students. The University of Westminster Multimedia TV project (albeit on a modest scale) saw:

> *Strong evidence that the OER content is influencing students decisions to study on the MSc in MM ...*

and also noted the:

> *... importance of the OER content as an additional source of information when students make informed decisions about what courses to do*[35]*.*

However, this brings clear challenges. Even within the current cohort educators have expressed concern that the views of OER students have not been sufficiently built into the design of learning. Now they face not only an even wider and more diverse *intake*, but also the uncertainty of not knowing who the end user may be.

It was noted across several projects that the challenge is less making resources 'open', but rather making them open *and* 'useful'. Coventry University's Open Content Employability Project (OCEP) was one of a number of projects to propose that one component of the solution is a pedagogic 'wrapper' to suggest context[36]. A respondent to the OERP Evaluation observed that:

> *Releasing resources (previously used to support to campus based students) is not without difficulties i.e. the context is missing, the rationale for the production of the resource is missing and the (typical) on-going dialogue about the resource is missing. This project really reinforced the notion that 'resources' are not always so standalone*[37]*.*

However, elsewhere some pilot programme project participants reported that students preferred 'small resources'. In particular the OpenSpace project:

> *... found that independent informal learners did not want to be strongly guided through materials, and implemented a more flexible navigation structure that enabled easy movement back and forth*[38]*...*

and:

> *They have also noted that many independent learners want to dip in, just to resources that are of immediate relevance to them, rather than to follow a set path through a*

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[35] **University of Westminster Multimedia Training Videos: Final Report** (Russell Stannard 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Westminster_final_report.pdf. We make no apology for footnoting each Final Report URL even though they are all in our bibliography. Some of them have URLs rather hard to find and the lead author is not always clear.

[36] **University of Coventry Open Content Employability Project: Final Report** (David Morris 2010) http://www.jisc.ac.uk/media/documents/programmes/oer/ocepfinalcomplete_web.pdf

[37] **Loughborough University Open Engineering Resources Pilot: Final Report** (Rob Pearce, Alex Fenlon 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Engineering_final_rep.doc

[38] **JISC/HEA OER Programme: Pilot Phase Synthesis and Evaluation Report** (Lou McGill, Helen Beetham, Isobel Falconer, Allison Littlejohn 2010) https://oersynth.pbworks.com/w/page/29749634/Pilot-Phase-Pedagogy-and-End-Use-Issues

> *unit of study. Projects see this as a more learner-centric approach, that has implications for the way they structure their OERs*[39].

In their evaluation and synthesis McGill *et al*. (2010) note that this somewhat contradicts some widely held assumptions concerning learners preferences for structured and guided pathways. Clearly, there appears to be a demand for levels of granularity (lecturers also expressed a preference) but also a need to contextualise these resources. On a more pragmatic note the Open Space project tested resources and found the need for consistency (do not interchange 'session' and 'unit') and appropriateness for the audience (do not use 'pedagogy') of terminology used when describing resources[40].

Locating resources

Across both the pilot programme (e.g. BERLiN[41]) and the RePRODUCE programme (e.g. MOSAIC[42]) participants stressed the need for institutions to maximise discoverability of their (open) content by locating it where potential users (students and staff) may already be looking e.g. Google, Flickr. BERLiN suggested this may not only increase use but also reuse. While this may seem a wise strategy if attempting to maximise use and reuse, it is by no means the case that today's learners eschew more formal locations for learning resources.

The OTTER project at the University of Leicester undertook probably the most systematic collation of learner feedback with regard to OER (71 students responded) and discovered that the favoured places to access the OER were the institutional VLE and OER repositories[43]. At Newcastle University it appeared that the medical students adopted very similar search strategies to their lecturers, favouring a single search box and only adopting more sophisticated approaches if the initial search yielded too few or too many resources – or if they were searching for something specific[44]. It was observed that students appeared "more informed about conducting search queries" and used a wider range of sites than their lecturers.

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[39] **JISC/HEA OER Programme: Pilot Phase Synthesis and Evaluation Report**
(Lou McGill, Helen Beetham, Isobel Falconer, Allison Littlejohn 2010)
https://oersynth.pbworks.com/w/page/29749634/Pilot-Phase-Pedagogy-and-End-Use-Issues

[40] **University College Falmouth *Open Space: Final Report*** (Alex di Savoia2010)
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_final_report_openSpaceFinalMay2010v2FALMOUTH.doc

[41] **University of Nottingham Building exchanges for research & learning in Nottingham** (BERLiN): Final Report (Andy Beggan, John Horton, Alison Johnson, Steve Stapleton 2010)
http://www.jisc.ac.uk/media/documents/programmes/oer/berlin_final_report_v1.0.pdf

[42] ***JISC Programme Summary Report:* Re-purposing & re-use of digital university-level content & evaluation (RePRODUCE**) (anon 2009)
http://www.jisc.ac.uk/media/documents/programmes/elreproduce/jisc_programme_summary_report_reproduce.doc

[43] **University of Leicester Open Transferable Technology-enabled Educational Resources (OTTER) Project Final Report** (Gabbi Witthaus, Dr Alejandro Armellini 2010)
http://www.jisc.ac.uk/media/documents/programmes/oer/otterfinalreport27april2010_v2%201.pdf

[44] **Newcastle University MEDEV OOER Final Report** (Suzanne Hardy 2010)
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/MEDEV_OOER_final_report_v1.pdf

> *This was not so surprising, as students are perhaps more motivated to find learning resources to aid their understanding than teachers are to aid their teaching*[45].

This may also have been attributable in part to the research skills taught by the library. Even allowing for this, Google was the preferred service and Wikipedia was also popular.

These findings are contradicted somewhat by the EPHRUM Project survey[46] of 101 students, which found, when asked 'How do you locate e-learning resources relevant to your course?', that general search engines such as Google were the *least popular* of the five options, with by far the most popular being tutor recommendation, followed by peer recommendation. While the question did not refer specifically to the OER it would seem reasonable, given the context, to recognise that student attitudes to issues of provenance and credibility merit further investigation.

Provenance and credibility

Projects in both programmes supported the EPHRUM survey above, even where it was OER in question:

> *It appeared that students particularly valued identifiable/verifiable quality (materials from reputable sources), and to be very strategic when searching. This has serious implications for the direct uptake of OER by students where quality seems to be estimated by Google ratings or the reputation of the organisation or provider, rather than independent reviews*[47].

The ADAPT Project at the University of Central Lancashire[48] reported anecdotal evidence that the reason their students favoured materials being supplied through the VLE – by their own lecturers – is that this implies that the materials have been quality pre-assured. Students are reluctant to use web-sourced materials since they have not (yet) been approved.

Formats and media preferences

While the range of projects made use of a broad spectrum of formats from simple text, worksheets and PowerPoint to online quizzes, audio, video (and animation) and simulations, it is unsurprising that many identified video and audio as areas potentially rich in sources and engaging to students. iTunes and YouTube, for example, would seem familiar to all but the least technophile of students and indeed their ubiquity may help circumvent some of the barriers raised by the variable skills of students. Of course, for those away from the campus the lesser speed of internet provision may

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[45] **Newcastle University MEDEV OOER Final Report** (Suzanne Hardy 2010)
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/MEDEV_OOER_final_report_v1.pdf
However, later the report states that: "*Staff were more likely to seek materials from a wider range of sources, probably because they had greater ability to distinguish good from poor quality without having to cross check them.*"

[46] EPHRUM **Student E-learning Resource Questionnaire** (anon 2009)
http://ephrum.pbworks.com/f/student_evaluation.pdf

[47] **Newcastle University MEDEV OOER Final Report** (Suzanne Hardy 2010)
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/MEDEV_OOER_final_report_v1.pdf

[48] **University of Central Lancashire ADAPT Project Final Report** (Helen Ellis 2009)
http://www.jisc.ac.uk/media/documents/programmes/elearningcapital/adaptfinalreport.doc

have an impact on the usability of the resources but for most domestic (UK) students, with home access, this potential barrier should not prove prohibitive.

With this in mind there were some interesting outcomes from the JISC projects. While one needs to exercise caution in taking 'student usage' of resources as a proxy for 'student views' of resources, the University of Oxford Open Spires[49] observation that, given the choice between audio and video for the same resource, audio downloads "outstrip video by a clear margin" has some profound implications.

Audio is less demanding to produce and make available but if accessibility best-practice is applied, both would usually require close captioning (both for the hearing impaired and possibly as translations). Open Spires and University College Falmouth's Open Space[50] project both reported that the cost of transcription and captioning was currently prohibitive (at least within the project budgets). However, there is a possibility that the openness of the resources will allow institutions to offer tools for the user community (and/or others) to provide transcriptions and perhaps even captioning.

Having looked at the popularity among students of YouTube and the availability of short chemistry video clips, the University of Lincoln decided to refine this approach and, with students, co-create their own videos:

> *It is known that successful learning can take place through student peer interaction in formal and informal settings and that encouraging students to be producers, rather than simply consumers, is core to our institution's teaching and learning strategy. The project took advantage of the communication skills used between students in informal learning within the video clips. It is also widely accepted in teaching that animation can be a powerful tool for visualising difficult ideas and so they incorporated animations into the clips[51].*

The University of Lincoln decided to build on the success of this project (the FED project) and funded two graduate students to produce multimedia resources for the entire course – this included five radio programmes. The decision to host student produced videos on YouTube also appears to have paid dividends both in relation to volume (to investment) and (anecdotal) feedback from students:

> *Although we have done nothing in the way of publicising the videos on YouTube yet, they have been viewed, on average, over 1,280 times so far, with some receiving over 2,000 views. Comments by viewers are generally positive and show that the videos are being used by students. Our favourite comments are:*

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[49] **Oxford University Open Spires Project Final Report** (Lisa Mansell, Rowan Wilson, Peter Robinson, Melissa Highton 2010) http://www.jisc.ac.uk/media/documents/programmes/oer/openspires_final_report_v4_22_april_2010.doc

[50] **University College Falmouth *Open Space: Final Report*** (Alex di Savoia2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_final_report_openSpaceFinalMay2010v2FALMOUTH.doc

[51] **University of Lincoln ChemistryFM Project Final Report** (Joss Winn 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Lincoln_Final_Report.pdf

> *5 Star, brilliant, 100% original and what a refreshing explanation to the rest of the tedious drivel I have been listening to on here about Hess' Law. Top draw...!'*
>
> *This is the only video I have been able to find (on standard deviation) that was specific for measurements in chemistry; most refer to populations and, therefore, seem to exclude even mentioning the utility (or existence) of the 'n-1' equation. Thank you very much for your explanation.*

By contrast, the project website has received very few visitors, with just 980 visits in total, 14% referred from YouTube and 33% from Google searches. Around 25% appear to have come from Twitter[52]*.*

At the most sophisticated end of the OER produced in the JISC projects are the St George's Virtual Patients[53]. St George's repurposed six virtual patients from the University of Heidelberg. These were recontextualised in relation to language, culture and pedagogy, refined from linear to branched learning pathways and then embedded within an accredited module. St George's undertook a detailed student experience evaluation programme (with a dozen students) and discovered that "under normal circumstances" the students preferred textbooks to the RLO they had used. This may have been because the RLOs sometimes mimicked information that could have been included in textbooks. However, the virtual patients received extremely enthusiastic responses from students who felt that these were the most valuable e-learning resources they had encountered:

> *All of the student feedback from these evaluation studies strongly supported the quality and value of the VP resources as a unique learning resource, largely because the VPs filled a pedagogic gap in the teaching of clinical decision making skills. The only alternative resource was real patients. Staff and students highlighted small technical and interface issues that were easily addressed*[54]*.*

While the student responses were not explicit that it was the 'reusability' of the resources that was so highly valued, it would seem fair to comment that resources such as the virtual patients may only be available as a consequence of the OER ethos. Bespoke commercial offers would be economically prohibitive and restrictive:

> *The very factors which increased the time taken to repurpose VPs i.e. adding choices and consequences, was the element that students described as most important to their learning.*
>
> *Resources with limited value are difficult to sustain beyond the life of the funding which 'repurposed' them, because there are no drivers to do so. VPs are expensive to create*

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[52] **University of Lincoln ChemistryFM Project Final Report** (Joss Winn 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Lincoln_Final_Report.pdf

[53] **St George's, University Of London Repurposing Existing Virtual Patients: Final Report** (Chara Balasubramaniam and Terry Poulton 2009) http://www.jisc.ac.uk/media/documents/programmes/elearningcapital/revipfinalreport.pdf

[54] **St George's, University Of London Repurposing Existing Virtual Patients: Final Report** (Chara Balasubramaniam and Terry Poulton 2009) http://www.jisc.ac.uk/media/documents/programmes/elearningcapital/revipfinalreport.pdf

> *and they offer unique learning opportunities, and so they tick the right boxes for value as assessed by teachers and learners. They will be sustained indefinitely and updated when necessary, because they are too valuable to leave inactive*[55].

Student attitudes to sharing

Student attitudes to sharing content were generally positive although somewhat inconsistent. In the OTTER Project students mainly felt that openness and sharing with regard to learning resources was to be supported and that OERs enhanced the quality of the learner experience. They also wanted to see policies that would encourage easy access to OER in a variety of formats. However, one-third of the students said they were not prepared to turn their own materials into OER and to share them with their peers[56]. Students taking part in the University of Bradford BrOME Project used the OER materials for revision purposes and shared their revision notes with the rest of their group[57].

In the MEDEV OOER Project students expressed apprehension about enlisting 'social' networking tools to share learning resources:

> *Students reported a wide variety of sharing knowledge about good resources or sites between peers using word of mouth as via email, or through specific collaboration tools such as when working in a small group on a shared task. Although student participants declared that they sometimes shared resources or links to resources via social networking sites such as Facebook, they did see Facebook in particular as a black hole of productivity.*

However, most students participating in the project said they did not share resources (or knowledge of them) with their lecturers[58].

5.1.3 Conclusions on JISC/HEA OER projects

The lack of substantial research into the specific issue of *how learners use and respond* to (specifically) OER has been dealt with above and it is clear that those engaged in the programmes studied here are all too aware of the need for further investigation. Indeed the synthesis and evaluation of the Pilot Programme notes that the emphasis was essentially on 'release' rather than use:

> *... evidence of demand and use is lacking, and is seen as a major gap in understanding. How OE students create self-directed learning goals, how OE students persist in the process of self-directed study and achieve their learning outcomes, models of pedagogy*

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[55] **St George's, University Of London Repurposing Existing Virtual Patients: Final Report** (Chara Balasubramaniam and Terry Poulton 2009) http://www.jisc.ac.uk/media/documents/programmes/elearningcapital/revipfinalreport.pdf

[56] **University of Leicester Open Transferable Technology-enabled Educational Resources (OTTER) Project Final Report** (Gabbi Witthaus, Dr Alejandro Armellini 2010) http://www.jisc.ac.uk/media/documents/programmes/oer/otterfinalreport27april2010_v2%201.pdf

[57] **Bradford Open and Mobile Education: Final Report** (Dr. Mark Van Hoorebeek 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Bradford_final_rep.docx

[58] **Newcastle University MEDEV OOER Final Report** (Suzanne Hardy 2010) http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/MEDEV_OOER_final_report_v1.pdf

for OE and building and sustaining communities of learners within OE are all areas that need substantial further research[59].

It is also clear that there is an intention that the continuation of these projects will present the opportunity to undertake more detailed studies and the majority of projects appear to have planned this into their strategies. They could then provide an invaluable resource for informing future OER policy.

In some cases only a single project has addressed key potential issues: for example the Open Space project seems alone to have built in peer-assessment and critique with a view to developing support for users[60]. Elsewhere, issues of IPR for learner-created or amended resources have been to some degree(s) confronted, as have the skills to manipulate content, but the learners' views are not *yet* commonly solicited or apparent. McGill *et al*. (2010) also note that metadata and accessibility issues fare even less well with decisions regarding the most appropriate tools to use (understandably, given budgets and timescales) largely made *on behalf* of the learners[61].

The barriers raised in the synthesis and evaluation of the Pilot Programme such as inequality of access, increased need for tutor guidance in locating and using OER, variable quality and the lack of feedback[62] have not been addressed here since we have few learner voices on which to draw. However, the ethos explicit in the project plans suggests that input from learners to resolve these (and identify other) issues will be sought and may also prove of considerable worth.

The overwhelmingly positive feedback to the resources across both programmes is encouraging but as stated above rarely proves (from the student perspective) the additional merit of OER. Much of the feedback could apply to closed and/or proprietary online resources. That is to say, much of the enthusiasm is generated either by the ability to access materials away from the classroom/campus or pre-/without enrolment. However, the feedback and other achievement and retention data indicate at the very least 'no harm done'. Taken in the context of the potential of OER to expand choice through tailored offers this looks significant. The St George's virtual patients illustrate niche resources that would be unaffordable under normal circumstances. Other projects demonstrated the potential for staff (and occasionally students) to react to feedback from learners and refine the OER and the support structures that surrounded them.

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[59] **JISC/HEA OER Programme: Pilot Phase Synthesis and Evaluation Report**
(Lou McGill, Helen Beetham, Isobel Falconer, Allison Littlejohn 2010)
https://oersynth.pbworks.com/w/page/29749634/Pilot-Phase-Pedagogy-and-End-Use-Issues

[60] **University College Falmouth *Open Space: Final Report*** (Alex di Savoia 2010)
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_final_report_openSpaceFinalMay2010v2FALMOUTH.doc

[61] **JISC/HEA OER Programme: Pilot Phase Synthesis and Evaluation Report**
(Lou McGill, Helen Beetham, Isobel Falconer, Allison Littlejohn August 2010)
https://oersynth.pbworks.com/w/page/29749634/Pilot-Phase-Pedagogy-and-End-Use-Issues

[62] **JISC/HEA OER Programme: Pilot Phase Synthesis and Evaluation Report**
(Lou McGill, Helen Beetham, Isobel Falconer, Allison Littlejohn August 2010)
https://oersynth.pbworks.com/w/page/29749634/Pilot-Phase-Pedagogy-and-End-Use-Issues

OTTER

Special mention needs to be made of OTTER (a JISC/HEA OER Pilot Programme at the University of Leicester[63]). Their research report *Open Transferable Technology-enabled Educational Resources (OTTER) project: Stakeholder views on open educational resources* by Dr. Samuel Nikoi in June 2010[64] quotes Harley (2008):

> *User studies that measure the number of 'hits' or page-views to a site, or report out on anecdotal and random responses to online website surveys, are ubiquitous and frequently used as evidence that a particular Web resource has 'value'. These measurements surely indicate a form of popularity, but they tell us only about relatively enthusiastic users of a particular brand of content. They reveal nothing about whether a brand may be valued or useable by a wider potential audience operating in complex formal educational institutions that confer degrees or certificates.*

Their survey had 71 student respondents in total.

Key findings from students

1. *Students support the open sharing of teaching and learning resources and view OERs as supplementary resources that could improve the quality of their learner experience.*
2. *Students find it very easy to navigate through current OERs available through the Plone site of the UoL (http://www.le.ac.uk/oer).*
3. *96% of students rated the quality of the OTTER OERs as 'good' to 'extremely good'. The 4% who were unhappy attributed this to links in the zipped files in the Plone site that appeared to be broken. (This was rectified through a 'Read Me' message that appears on every page of the Plone site, advising users that zipped folders need to be extracted in order to function effectively.)*
4. *Students appear to have adequate knowledge of Creative Commons licensing, but express concerns about the implications for the institution's reputation in the event that the materials are misused by third parties.*
5. *The preferred options for access to OERs are the institutional virtual learning environment (VLE) and OER repositories.*
6. *Students are happy with the quality of OERs produced through OTTER, based on the concise nature of information provided as well as the structure and layout. However, they express concern about quality and sustainability of future OERs.*
7. *A third of students say they would not be willing to turn their own materials (e.g. lecture notes) into OERs and share them with other students.*

[63] http://www.jisc.ac.uk/media/documents/programmes/oer/otterfinalreport27april2010_v2%201.pdf
[64] http://www2.le.ac.uk/departments/beyond-distance-research-alliance/projects/otter/documentation/researchreport.pdf

8. *Students would like to see future policies address the issue of easy access to OERs in different formats to support teaching and enhance the student learning experience.*

> *It looks very, very useful and provided it is kept up to date, and provides something different from the resources already available on Blackboard it could be very popular.* (Student)

> *I look forward to it being more commonly used and more information to be available as I will definitely refer to it to improve my learning.* (Student)

5.1.4 OpenLearn

In the UK, The Open University's OpenLearn[65] project (and related activities) is (or rather was) the only other major OER initiative at national level. Thus it is convenient to discuss it here, focusing on two of the key papers.

1. DESIGNING FOR INNOVATION AROUND OER (IN JIME SPECIAL), by Andy Lane[66]

Abstract: This paper argues that designing collections of 'closed' educational resources (content and technologies) for use by specific student cohorts and collections of open educational resources for use by any 'learner' require different design approaches ... there appears to be a paradox in that learning design assumes a reasonably well-known and well-defined student audience with presumed learning needs and mediating technologies while OER are exposed to a multitude of potential learners, both formal and informal, with unknown learning needs and using diverse technologies ... it is necessary to design for greater flexibility so as to allow the users to adapt their use of the innovative solution for their own requirements once it has been deployed. The use of such an 'innofusion' approach for OER is highlighted using the case study of OpenLearn.

> *With OER there are potentially many more people and processes that are able to utilise open content and open technologies in novel ways not thought of by their originators.*

Discussing the "six trends" in the components of educational systems (analogue to digital, etc.) Lane says:

> *The scale of the impact of these six trends on education is difficult to predict as they have emerged at a fairly rapid rate and without any end in sight to such developments. Will many people actually construct their own, personal learning experiences? Will many modify what others have produced?*

> *However in terms of enabling innovation these different factors do allow learners to make such choices if they wish. They are not as constrained by pre-defined products and processes and can experiment as much as they might want to.*

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[65] See: http://www.open.ac.uk/openlearn.

[66] Lane (2010) see http://jime.open.ac.uk/article/2010-2/pdf. For more on the "six trends" see David Wiley and John Hilton, Openness, Dynamic Specialization, and the Disaggregated Future of Higher Education, IRRODL, Vol. 10 (5), 2009, http://www.irrodl.org/index.php/irrodl/article/view/768/1414.

For learners, both students in HEIs and self learners not currently studying at an HEI, the main value has come from the content and the fact that it is designed for self-study. Many registered users also value the technologies that allow them to augment their study e.g. through learning journals or make contact with fellow learners, the latter particularly happens where students waiting for the start of their Open University course start up conversations on a related Study Unit, and then stop doing so when their course actually starts and they have the online course forum to use. However, so far more users are interested in the content than connecting with other learners and with most visitors coming through search and given the levels of downloads it appears that the majority are more information seekers than looking for a richer learning experience. Nevertheless, users have adopted and adapted their practices and readily provided suggestions for changes to the site or for new content they would like to see.

2. Survey of Registered OpenLearn Users, by Steve Godwin (2008)

Demographics:

- *65% of sample were UK based;*
- *users are likely to be well-educated and confident learners – graduates;*
- *35-54 dominant age group;*
- *many registered users have a connection with The Open University;*
- *evidence of deep learning – self-motivated individuals;*
- *evidence of support for other study (past, current, future);*
- *users spent a median time of ten hours on the internet each week: the main reason chosen for using the internet was 'finding information about something' (approx 95% of users).*

Views:

- *high value is placed on OpenLearn as a resource;*
- *ways to test and assess learning are considered an important feature;*
- *a large choice of content is considered to be important;*
- *interactive content is considered an important feature;*
- *the dominant activity is working with content;*
- *evidence for using OpenLearn to help in decision making about studying;*
- *lower usage and priority of social tools in OpenLearn;*
- *the courses were about the right challenge for users;*
- *92.6% of high users learned something from the unit;*

- *42.3% of high users printed out some unit material;*
- *about 60% of these users find out about OpenLearn from The Open University website.*

5.2 Literature survey of learner use of OER (projects and papers other than those directly funded by the JISC/HEA OER Programme)

It is our tendency to begin any literature search by analysing bibliographies deemed relevant to the topic, as it is reasonable in most cases to assume both that these exist and that they will, at least in part, provide an overview of the terrain. Early on in this study we were surprised to discover the absence of any hits on Google for the phrase 'bibliography of OER' (even *without* the restriction to learner use) – and to discover that the first hit for the combined search terms is *our own work*[67]. There is only one relevant hit (out of five search results total) for 'OER bibliography' and to no great surprise that comes from the JISC/HEA OER OTTER project (Nikoi 2010). We also found that in the Mendeley world, there were no non-trivial bibliographies on any aspect of OER until we started our own work. (Outside the scope of this study, we have already noted the very limited coverage of national policy aspects of OER[68].)

Thus we began our non-'JISC/HEA OER' research from scratch. The areas of OER research most commonly addressed in academic essays (nearly all of which have been published since 2005) include content production, sustainability and business models, with most providing comprehensive overviews of the field or of its existing repositories. In recent years an increasing amount of attention has been paid to the experience of 'OER stakeholders', but it is disappointing to note the frequency with which learners themselves are excluded from this category. Similarly, a paper seeking to address the experience of 'end users of OER' will frequently interview only librarians, faculty, and university staff – occasionally going so far as to ask their *opinions* of how students use OERs, but rarely surveying the student population *directly*.

In other words, when we expand our literature search behind the scope of JISC/HEA OER, we find that – although there have been several thousand[69] papers published that address *some* aspect of OER – there is a surprisingly limited selection of studies and publications directly (and primarily) addressing the topic of 'learner use'.

We have found only about 80 additional publications deemed as directly relevant to the topic. (For more details see section 3.) That said, these items examine the experiences of individuals exposed to a fairly broad and representative range of open content initiatives and programmes, and we have been able to extract some healthy conclusions in section 5.2.5 below.

Relevant publications have been classified as follows:

- *most relevant (L5)*: take learner use of OER as their *primary and exclusive topic*;

[67] http://luoerl.referata.com/wiki/Interim_Bibliography_of_Learner_Use_of_OER
[68] http://www.mendeley.com/groups/1075011/national-policies-for-oer-uptake/papers/
[69] As judged by Google Scholar – http://scholar.google.co.uk/scholar?hl=en&q=%22OER%22+open+educational+resources&btnG=Search&as_sdt=1%2C5&as_ylo=&as_vis=0.

- *very relevant (L4)*: address learner use of OER *in conjunction with other topics*, but nonetheless provide real insight into learner identification, selection and/or use of OER;
- *relevant (L3)*: offer significant learner use of OER content, and – while *their focus may lie elsewhere* – are deemed unambiguously 'relevant' to the topic;
- *related (L2)*: primarily address another topic, but *still offer some insight* into learner use of OER – if only in brief;
- *somewhat related (L1)*: are *tangentially related* to the project, and may even have been considered for deletion – but we have kept them in the bibliography for completeness[70].

Categories L5, L4 and L3 are dealt with in the next three sections. The less relevant material (categories L2 and L1) is found in Appendix 4.

5.2.1 'Most relevant' OER resources

These are tagged 'L5' in the online bibliography.

The 11 'most relevant' non-'JISC/HEA OER' items confirm that postsecondary student use of OER is indeed being examined worldwide (and in the US and the UK in particular). Here we see OERs that are largely programme-specific, e.g. they have been produced in conjunction with a particular university course; studies tend to stay close to home, i.e. to examine a local user population. Two items focus on use of a certain content type (podcasts and Wikipedia).

1. *It turns out that students do use OER and it does save time* (anon 2011) reviews supporting data gathered for a recent Open Nottingham JISC/HEA OER bid, providing relevant links for further research (see OER Re-use Student Survey below). [UK]
2. *OER Re-use Student Survey* (Stapleton *et al.* 2011) from Open Nottingham surveys 51 undergraduates' use of OER, showing that respondents are using OER; lecturers are guiding students to OER; students are citing OER in assignments; and more. [UK]
3. *Listening for Impact: Final Report* (Geng *et al*. 2011) is an University of Oxford study offering a detailed examination of how learners presently use open educational podcast content. [UK]
4. 'Designing for innovation around OER': *JIME OER Special* (Lane 2010) is a synthesis and analysis of student views of OpenLearn – examined closely in section 5.1.4. [UK]
5. 'Open Content: when is it effective educationally?' (Lane 2007) delivers a well-researched and well-cited general analysis of learner-content interaction (and other topics). He concludes that OERs should be presented in an environment that allows learners and creators to communicate with each other, adding a sense-making layer to the original material. [UK]

[70] The relevance of the remaining four items is unknown as we were unable to access their full texts even via access to a comprehensive university collection (EBSCOhost); these are tagged 'restricted-access' in Mendeley.

6. 'The networking effects of OER' (Lane *et al*. 2009) reviews various ways of analysing student use of online materials via the OU's OpenLearn (and several other communities). [UK]

7. 'Impact of Open Educational Resources in The Netherlands' (Schuwer *et al*. 2007) analyses via survey which students choose to use OER and how they do so. [Netherlands]

8. 'The Open Learning Initiative: Measuring the Effectiveness of the OLI Statistics Course in Accelerating Student Learning' (Lovett *et al*. 2008) documents learning effectiveness studies focused on an OER-based course conducted from 2005-2007, investigating its effectiveness. Results were encouraging, suggesting (for example) that its students took half the time to learn as much as or more than their traditional counterparts. [US]

9. *MIT OpenCourseWare 2005 Program Evaluation Findings Report* (Carson 2006a) provides a detailed analysis of user characteristics and behaviour when interacting with MIT OCW materials. Data sources include web metrics; surveys of OCW users, MIT faculty/students/alumni; email feedback; OCW visitor interviews; and affiliate project data. Includes survey responses from 4,115 site visitors. [US]

10. 'How and Why Do College Students Use Wikipedia?' (Lim 2009) reviews a web survey to explore college students' perceptions, motivations and uses of Wikipedia, and to understand these based on social cognitive theory (SCT). All students surveyed report having used Wikipedia, typically for finding background information. Students' emotionality affects their perceptions of the tool. [US]

11. 'Revolutionizing Education through Innovation: Can Openness Transform Teaching and Learning?' (Casserly & Smith 2008) provides descriptions of select OERs and how students interact with them. [US]

5.2.2 'Very relevant' OER resources

These are tagged 'L4' in the online bibliography.

Excerpted components of JISC/HEA OER reports, disseminated separately, emerge among the 20 'very relevant' non-JISC/HEA OER items. More abstract and contemporary in format than those items listed in section 5.2.1, many of these lean towards new media as a means of dissemination, using (e.g.) blogs and mindmaps. New learning styles are examined and tested, with a plea for wrapping 'community' and conversation around OER resources. Articles are neutral in tone and overwhelmingly (but coincidentally!) stem from UK labs undertaking more formal JISC/HEA OER studies.

1. *Institutional Strand – Pedagogy And End Use Issues* (anon 2010b) offers a theoretical and future-looking summary of some JISC/HEA OER projects' approach to learner use issues. (One project carried out surveys with learners, but – as analysed above – most felt that more work was needed to understand learner needs and use patterns.) [UK]

2. *Institutional Strand – Learners And Other Stakeholders* (anon 2010a) touches briefly on the subject of students as co-creators of OER. [UK]

3. ‘Evidence Hub for Open Education Resources’ website (anon 2011) offers a fledging evidence base on learner use of OER, addressing all the right topics for this critical area (albeit in preliminary alpha format). [UK]

4. ‘Collective intelligence for OER sustainability’ (Buckingham Shum & De Liddo 2010) very directly approaches the ways in which a ‘community of inquiry’ studies and discusses student use of OER, proposing use of a ‘collective intelligence’ infrastructure. [UK]

5. ‘Exploring user types and what users seek in an open content based educational resource’ (Godwin & McAndrew 2008) provides an overview of the online activity of approximately 65,000 OpenLearn users registered with the OER site: select users identify how they view OpenLearn content and its relationship to their learning. [UK]

6. ‘Repurposing with a purpose: A story with a happy ending’ (Greaves *et al*. 2010) equates reusable learning objects (RLOs) with OER, considering its impact in helping to improve the student learning experience and student success rates. Student achievement in a first-year science module before and after the introduction of an OER is explored. [UK]

7. ‘Are digital natives a myth or reality? University students’ use of digital technologies’ (Margaryan *et al*. 2011) interrogates learning styles among young people, offering detailed statistics on the use of Google, Google scholar, Wikipedia and other tools for learning. [UK]

8. ‘Open Learning Network: the evidence of OER impact’ (McAndrew & Cropper 2010) directly addresses the need to study the impact of OER on learners. [UK]

9. *OpenLearn: Research Report 2006-2008* (McAndrew *et al*. 2008) takes advantage of automated collection of data through tracking of Moodle logs, cross-correlation of data with other Open University sites, and Google Analytics. The report identifies patterns in learner experience, drawing on OpenLearn participants by studying their actions, carrying out surveys and analysing responses – in the context of understanding how open content works, and how its learners see themselves. [UK]

10. *Open Transferable Technology-enabled Educational Resources (OTTER) project: Stakeholder Views on Open Educational Resources* (Nikoi 2010) gathers and reports on from 71 students, including many direct quotes. A supporting document to the JISC/HEA OER report; responses are fascinating. [UK]

11. ‘The feasibility of capturing learner interactions based on logs informed by eye-tracking and remote observation studies’ (San Diego & McAndrew 2009) attempts to illustrate the feasibility of examining, identifying and observing ‘learning’ and ‘browsing’ actions based on OU OpenLearn user logs. [UK]

12. The *OER Use and Reuse Landscape* (TALL, 2011) mindmap divides a linear bibliography into sections by stakeholder, e.g. “what attributes of OERs determine their usefulness (evidence-based)”. Learner information is sparse but present and well organised for review. [UK]

13. ‘Who is using Open Educational Resources?’ (White 2010) is a slight but relevant blog posting, offering links of interest. [UK]

14. 'Sharing and reuse in OER: experiences gained from open reusable learning objects in health' (Windle *et al*. 2010) offers a good amount of student focus and review of student feedback, highlighting the importance of OER community, ownership and empowerment. Published figures portray learner OER usage data. [UK]

15. 'The Advancement of Lifelong Learning Through Open Educational Resources in an Open and Flexible (Self) Learning Context' (Mulder 2007) surveys 35 students about their OER usage, attitudes and preferences. Issues of quality and appeal are briefly addressed. [Netherlands]

16. 'Why Understanding the Use and Users of Open Education Matters' (Harley 2008) probes the importance of gathering data on student demand for OER, placing this in the context of student experiences. [US]

17. *MIT OpenCourseWare 2004 Program Evaluation Findings Report* (Carson 2005) gives a detailed and unprecedented analysis of MIT OCW user characteristics/behaviour when interacting with OCW materials. [US]

18. 'Incentives and Disincentives for the Use of OpenCourseWare' (Arendt & Shelton 2009) provides a fascinating glimpse into Utah residents' general attitude towards and (limited) past experience of OER, as determined by a state-wide survey. [US]

19. 'Young Adults' Credibility Assessment of Wikipedia' (Menchen-Trevino & Hargittai 2011) deploys Wikipedia in the classroom to explore whether young people grasp the provenance of Wikipedia content – and ask how this impacts their sense of its credibility. Observations and interviews are reviewed, providing useful sample data e.g. what percent of students use Wikipedia and how they arrive there in the first place. [US]

20. 'Using Open Educational Resources To Help Students Understand The Sub-Prime Lending Crisis' (McDowell 2010) examines classroom use of OERs from the Kahn Academy. Feedback from students explores learner confidence, and reactions to and attitudes towards OER. [US]

5.2.3 'Relevant' OER resources

These are tagged 'L3' in the online bibliography.

The 'relevant' category comprises a wide and disparate group of 19 non-'JISC/HEA OER' resources, reflecting all article types seen above – and below.

1. *Building Exchanges for Research and Learning in Nottingham (BERLiN) OER Project Final Report* (Beggan 2010) looks at use of Google to 'discover' OER. Discusses role of feedback from collaborator *OER Africa* in enhancing its OER delivery. [UK]

2. 'Am I good enough? The mediated use of open educational resources to empower learners in excluded communities' (Lane 2008) proffers third-party narratives, discussing four cases in which mediated OER have been delivered. [UK]

3. 'How long will it take me? Assessing appropriate study times for open educational resources' (Lane 2007) reviews early evidence of how long OpenLearn self-learners spend studying. Research questionnaires are administered but not discussed in depth. [UK]

4. 'Re-invigorating openness at The Open University: the role of Open Educational Resources' (Lane & Gourley 2009) details the use of OpenLearn, e.g. via select data from surveys of registered users. [UK]

5. *OpenLearn: Researching open content in education* (McAndrew & Watts 2007) conference proceedings contain a number of relevant 'user experience' talks. [UK]

6. 'Open Oxford: assessing impact beyond the institution' (White & Highton 2011) is a posted presentation without audio or transcript, which still conveys more than average amounts of interesting data on learner use. [UK]

7. 'Self-learners' creating university of online' (Woods 2009) is an informal piece exploring (among other topics) learner use of iTunes U podcasts from OU, Oxford, Cambridge and others. [UK]

8. *Oriole* (Oriole 2011) project website reveals a focus on investigating the influence of digital/open educational resources in teaching and learning. [UK]

9. *Pearltrees Open Education* (Pearltrees 2011) is an OER presence on the Pearltrees social curation community, presenting OER resources, research, presentations, conference proceedings. [International]

10. 'From Open Content to Open Course Models: Increasing Access and Enabling Global Participation in Higher Education' (Morgan & Carey 2009) examines implementation of the [open course] model in three studies, relying on data collected from student interviews, instructor observations and reflections, discussion forum transcripts and more. Implementation with undergraduate students in Canada, Mexico and Russia is described. [International]

11. 'Youth Perception and Usage of Wikipedia' (Luyt *et al*. 2008) seeks to identify attractors, repellents and appropriation or disappropriation criteria for Wikipedia, assessing study data from respondents aged 13 to 24 (secondary/tertiary students and recent tertiary graduates). Fascinating direct quotes are included. [Singapore]

12. 'Open Educational Resources Plus Social Software: Threat or opportunity for Canadian Higher Education?' (Anderson 2008) provides an abstract but useful (and well-cited) overview of OER use in the student context. [Canada]

13. *MIT OpenCourseWare 2005 Program Evaluation Findings Summary* (Carson 2006b) provides a top-level analysis of user characteristics/behaviour when interacting with OCW materials. This is a summary of the longer 2005 report but does have some key snippets, e.g. that "35% of freshmen aware of OCW before deciding to attend MIT were influenced by it". [US]

14. *MIT OpenCourseWare 2009 Program Evaluation Findings Summary* (Carson 2009) provides a newer top-level analysis of user characteristics/behaviour when interacting with OCW materials. Not much on learners but does have some key snippets, e.g. that "the OCW site is being successfully used [for] ... student uses: enhancing personal knowledge (44%), complementing a course (39%), planning course of study (12%)". [US]

15. 'Open Educational Resources: New Possibilities for Change and Sustainability' (Friesen 2009) analyses how MIT OpenCourseWare is used by learners worldwide, and may serve as a model. [US]

16. *Why Study Users? An Environmental Scan of Use and Users of Digital Resources in Humanities and Social Sciences Undergraduate Education* (Harley *et al*. 2006) examines the "build it and they will come" approach to university digitisation initiatives, seeking to differentiate among OER users and the contexts in which OER can be used. Are users students, faculty, or self-learners?; and what is the importance of distinguishing among these users? Interviews are held with representatives from Carnegie Mellon OLI, MERLOT, MIT OCW and others. [US]

17. *The 2010 Horizon Report* (Johnson *et al*. 2010) offers an abstracted approach to ways in which students use open and other resources, e.g. via mobile device. Some anecdotal data is included in a special 2010 section on OER. [US]

18. 'Course Correction: Executive Summary' (Allen 2009) performs a survey of 504 students and 50 commonly assigned textbook titles. [US]

19. 'Trust Me! Wikipedia's Credibility Among College Students' (Clark *et al*. 2011) uses online surveys to determine how students utilise Wikipedia as an academic tool, and how credible they deem it to be. [US]

5.2.4 General findings on the more relevant papers

Our literature search shows that the general resources exploring learner use of OER (beyond the realm of the JISC/HEA OER studies) published to date are far from cohesive – and far from comprehensive. Key observations are as follows:

- 'Learner use of OER' as a topic has not yet been subject to the same level of scrutiny as learner use of more established educational tools, e.g. learning management systems, university library databases, synchronous/asynchronous communication tools, etc. We assume that it is only a matter of time before this becomes a more fully fledged research arena.

- The topic of learner use is nevertheless already (if slowly) gaining traction in the research community, as is that of user experience in general.

- However, many publications whose titles or abstracts seem to imply a learner use focus do not realise this in the full text (often because 'user' is defined as 'faculty member' or 'OER creator' only).

- We have the sense that numerous learner use authors do not consider themselves part of (or connected to) the more active OER community. Their publications therefore often stand alone, lacking bibliographies of great scale or relevance to a researcher.

- A large proportion of publications and studies stem from UK universities, although this was not the intended focus of our research beyond JISC/HEA OER projects – our coverage was global (among publications in English). It is clear that the JISC/HEA OER Programme and the

presence of The Open University/OpenLearn have had a significant impact, unequalled in any other English-speaking country.

- Similarly, many studies stem from, include or make mention of MIT OCW, reaffirming its long-standing prominence in this field – and more than 20 publications reference funding from the US-based William and Flora Hewlett Foundation, the leading grant-maker for OER.

- Not many papers yet seem to be emanating from EU projects, partly because they do not (so far) have learner use as a focus.

- An emphasis on assessing the experiences of learners situated in postsecondary educational environments is clear, leaving major gaps in our understanding of learner use of OER in primary, secondary, postgraduate, adult (except for university-level at open universities) and informal education.

- Studies involving human subjects tend to focus on the experiences of either small clusters of three to 100 students (typically under 50); or broad swathes of users (upwards of 3,000). Data may be collected through a combination of interviews; surveys; observation; focus groups; assessment; metrics; user logs; emails; and other means. There is little uniformity in methodology here, and so it is difficult to compare these studies and their results.

- The most popular academic dissemination routes include (but are not limited to) refereed journals (both open and restricted) and conference proceedings.

- Articles addressing learner use of OER tend to be neutral in tone and avoid sweeping generalisations of the sort more commonly found in surveys of the repositories available. Without a foundation of past studies to build upon, authors are appropriately exploratory and open about the limitations of the datasets with which they work.

- The educational usage and impact of iTunes U and Wikipedia are of particular interest to researchers outside of learning technology, with many articles published in mainstream media and general interest publications (especially in the US) – this may have an awareness-raising effect for OER in general.

- Generally speaking, we do find a richer set of articles, conference proceedings, and other media when we allow our research to stray beyond the confines of OER alone. Decades of well-cited research undertaken by the library science community in particular thoroughly address the search for and discovery of digital library resources in particular; these seem especially applicable to 'learner selection and use of OER'.

5.3 Literature survey of learner use of non-OER online resources

Looking beyond our primary project goal of seeking out conclusions relating to OER across the sectors, we find a plethora of the more general resources we categorise as 'learner use of non-OER online resources'. This is not to say that these do not (or would not) apply to OER; indeed, most of them do (with the exception of certain items outdated in critical and insurmountable ways). Recent research into the use of e-journals and e-books is particularly revealing, for example, and would seem to have the potential to map quite directly to use of OERs.

The 'non-OER' resources detailed below are far ranging (to say the least), given the scope of 'online resources' as a concept, but their subject matter can be sorted loosely into the following groups:

- *General use of any online resource*. These publications may address learner use of a website, a digital image collection, an e-journal, an e-book, or any other *content-based online object* that can be used by an individual to support his or her own learning.

- *Search and information-seeking behaviour*. Largely the domain of library science, these publications focus on internet search engines (and in recent years, Google), digital library collections, electronic library catalogues, and/or any online tool requiring keyword or more advanced search skills.

- *Comprehension of resource credibility and/or relevance*. These publications stray into the fields of education and learner theory, and in recent years have focused largely on learners' ability to judge authorship, validity, quality, and reputability of webpages – and Wikipedia in particular.

- *Active use of a digital resource*. Once a learner has selected a resource as relevant and meeting his or her search criteria, what does (s)he do with it? These publications look more closely at time spent on actual 'learning' once the search for content has been completed.

Mindful that it was not our task to master the realms of learner theory and library science under the remit of this project, we have sought to capture a representative sampling of articles from each category – and are pleased with the diversity of results.

We note that authors from these subject areas often have decades of well-cited publications on which to build their own positions, yet are limited quite unpredictably (like learning technologists) by the rapidly changing nature of the technologies they seek to address. For example, a paper from 1991 might seem surprisingly 'relevant' (e.g. in its explorations of the student experience of 'keyword searching an electronic library database'), while one from 2001 seems hopelessly out of date (in its focus on Yahoo! as the predominant search engine). Many of the resources to which we were directed by the Tender document did reference older (i.e. pre-2001) texts, and we have tried to include any with relevance.

Categories L5, L4 and L3 are dealt with below, the others in Appendix 4.

5.3.1 'Most relevant' non-OER online resources

These are tagged 'L5' in the online bibliography.

The 16 most relevant non-OER resources provide detailed studies of students' digital information-seeking behaviour; the usage of these tools' advanced features; use of e-books and e-journals; and millennials/'digital Natives' and their user characteristics.

1. 'Student digital information-seeking behaviour in context' (Nicholas *et al*. 2009) provides an excellent overview and bibliography in this area. To analyse student behaviour the team uses logs from two digital journal libraries, Blackwell Synergy and OhioLINK, and one e-book collection (Oxford Scholarship Online). The study shows a distinctive form of information-seeking behaviour associated with students as compared to other academics: students

constituted the biggest users in relation to sessions and pages viewed, and were more likely to undertake longer online sessions. Undergraduates and postgraduates were moreover the most likely users of university library links to access scholarly databases, suggesting an important 'hot link' role for libraries. [UK]

2. *User Behaviour in Resource Discovery: Final Report* (Wong *et al*. 2010) examines user search behaviour when interacting with digital library resources and the internet in general. It obtains data from an observational study and in-depth interview of 34 participants across Cranfield University, London School of Economics and Middlesex University. The most common library resources used by postgraduates and 'experts' are EBSCO, ProQuest or Emerald; the Library Catalogue and federated search engines (CrossSearch at Cranfield, QuickSearch at London School of Economics and MultiSearch at Middlesex University) are more popular among undergraduates. Google, Google scholar, Wikipedia and YouTube are the most popular free resources generally; postgraduates and 'experts' use Google scholar for overviews but return to e-resources to download. Participants rely on prior knowledge and experience with a resource, and usually carry out combined searches, e.g. where terms or concepts extracted from a document are carried out to pursue a new search. They are frustrated when promised documents are withheld (due to restricted access). Wong emphasises the need for making the "underlying database structure" visible, to simplify searching. As in other studies, e-textbooks are used mainly for snippets and fact finding. Here, students are the majority users but their use is 'lighter' as they tend to view fewer pages. As experience increases, reliance on 'internal' resources appears to increase, whereas reliance on 'external' resources decreases. In research-intensive institutions the use of databases is greater – although users spend less time on a visit, and using less of the functions on offer. [UK]

3. 'The Google generation: the information behaviour of the researcher of the future' (Nicholas *et al*. 2008a) analyses how the specialist researchers of the future (born after 1993) are likely to access and interact with digital resources in five to ten years' time. Its purpose is to investigate the impact of digital transition on the information behaviour of the 'Google generation', and to guide library and information services. The study – which includes extensive reviews of related literature, survey data mining and a deep log analysis of a British Library and a JISC website for younger people – finds that much of the impact of ICTs on the young has been overestimated. Young people rely heavily on search engines, view rather than read, and do not possess the critical and analytical skills to assess the information that they find on the web. Nicholas posits that in this sense they are not truly 'web literate'. [UK]

4. 'Engaging with scholarly digital libraries (publisher platforms): The extent to which 'added-value' functions are used' (Nicholas *et al*. 2006) provides a detailed description of digital scholarly journal users and their information-seeking behaviour, enabling comparisons between students, staff, academics and practitioners. This study looks at nearly a million users utilising deep log methods. It looks beyond simple use and browsing into the realm of constructing interest profiles, employing pop-ups, requesting articles by email and using the search engine. The study finds that the vast majority of its users did not use the digital library's extra functionalities on offer, and generalises that digital information consumers,

whether they are scholars or the general public, do not engage very deeply – with any one website, part or function of the website. They are generally characterised by their short attention spans and shallow searching. [UK]

5. The *JISC national e-books observatory project* (anon 2009) explores e-book usage at UK universities, revealing surprisingly relevant results. NeBO surveys received 52,000 responses, supplemented deep log analysis reports, focus group interviews and more. It reveals that "e-books are now part of the academic mainstream" and that libraries "are a key player in the emerging market for e-books". Select findings: *a) most e-books are discovered through library catalogues and library webpages; b) age and gender are important predictors of e-book take-up; c) e-books are seen as extremely convenient; d) they are used for quick fact extraction and brief viewing, not continuous reading; e) interest in e-books varies by subject; f) users don't like various routes to text discovery, and want a single search source like Google*. The role of the library in connecting students to these digital materials is key. [UK]

6. *Students' Use of Research Content in Teaching and Learning* (Hampton-Reeves *et al*. 2009) surveys over 400 students in four universities, asking fundamental questions such as: *How do users discover the existence of research content which may be useful in teaching and learning? How do they assess whether particular content will be relevant? How do they access the content they feel to be useful? How do they use the content they discover? Do they differentiate between formal, peer-reviewed content and other content they discover through the internet*? Most respondents (90%) were undergraduate students and 41% of them were in their second year of study. 68% of respondents were 18-22 years old and 32% were mature students. Finding are exceptionally relevant (abridged):

    a. *Students are aware of the qualitative distinction between published research and general internet sites.*

    b. *Students are not generally sophisticated in their understanding of things like peer-review or currency, there is a common view that if something is published it must be reliable.*

    c. *There is a growing diversity in the kinds of content identified as research but journal articles and books still dominate students' perceptions of what research is.*

    d. *Students are very reliant on library catalogues, databases and staff advice.*

    e. *Research content is seen primarily as a source for assignments and students' perception of research is very much led by the context of their assignments.*

    f. *Most students will go to their library catalogue first, then Google.*

    g. *A lot of students use Google but are bewildered by the amount of responses and will rarely look beyond the first couple of pages of search terms.*

    h. *An increasing number of students are using the limited preview facility in Google Books.*

i. *There is still a significant proportion of students who will use library visits in conjunction with or instead of the internet.*

j. *Many students are aware that sites such as Wikipedia are not respected by their tutors.*

k. *Some students will use a discipline-specific database to access research.*

l. *There is limited evidence of students using social networking and other Web 2.0 technologies to identify and access research.* [UK]

7. *E-journals: Their use, value and impact (Phases One and Two)* (Nicholas *et al*. 2011) offers a research paradigm potentially similar to that used by individuals seeking OER. It offers an in-depth look at how researchers in the UK use electronic journals, via deep log analysis across ten institutions and in six subject areas (biological sciences, chemistry, earth and environmental sciences, economics, history and physics), for the journal websites of two major e-journal publishers: Elsevier's ScienceDirect and OUP's Oxford Journals. The Phase One report finds that researchers are savvy when it comes to using e-journals, finding the information they need quickly and efficiently, and that higher spending on e-journals is linked to better research outcomes; student use is not explicitly addressed, but these 'learners' provide fascinating insights into the methods of more advanced users:

   a. *Many link to publication gateways via Google/Google scholar, then stay on the journal site only long enough to collect the article.*
   b. *Once users enter a journal site they tend to browse rather than use the site's own search facility. Advanced search functions are rarely used at all.*
   c. *Almost a quarter of ScienceDirect use occurs outside the traditional 9-5 working day.*

   The aim in the Phase Two report was to test and examine user behaviours identified in Phase One, this time for students as well: e.g., Why do users spend so little time (i.e. seconds) on each visit? (Because they arrive there via gateway services, their search already completed). Why do researchers use gateway sites like Google, Google scholar, Web of Knowledge? (They cover a vast number of journal titles and articles, conference papers, technical reports and dissertations; "there is simply more in the shop window than on any publisher's platform"; also they are "intuitive to use".) The study finds that even these advanced researchers use the advanced search facilities very rarely. Data gathered includes surveys with 308 PhD candidates, interviews with 15 university students, and observation of six undergraduates, analysing routes for access, search terms and use of advanced facilities, selection of articles and relevance judgments. Results suggest that student usage of e-journals is substantial. [UK]

8. 'E-textbook use, information seeking behaviour and its impact: Case study business and management' (Jamali *et al*. 2010) uses NeBO data to evaluate the e-book usage and information-seeking/reading behaviour of thousands of business and management students (versus students in other subjects). The main sources of data were deep log analysis for 127 UK universities, questionnaire data for more than 5,000 students and staff, focus groups and more. The main findings were that e-textbooks can prove to be extremely popular and widely used, mainly for obtaining snippets of information and for fact finding, ease of access

and convenience. The team also sought to gain an understanding of work patterns, attitudes to reading, location and content discovery issues, added-value and on-screen design issues, impacts on teaching and learning and more – data that can be extrapolated into an OER object context. [UK]

9. 'Towards a theory of online learning' (Anderson 2008) is a highly theoretical approach to understanding online learning. Looks at learner-, knowledge-, community- and assessment-centred contexts, in light of the affordances of the world wide web and Semantic Web. [Canada]

10. 'Information-Seeking Behavior in Generation Y Students: Motivation, Critical Thinking, and Learning Theory' (Weiler 2005) is an oft-cited text, which suggests (among many other things) that students will seek to avoid reading text where possible. It considers a focus group study done at the University of Idaho Library, in which students explicitly discuss their 'needs' (seen as defining 'what they will learn'). High on their lists when seeking information were: ease of use, reliability, accuracy, currency, availability, and [low] cost. Other terms they mentioned were trust, quality, credibility, validity, completeness, and comprehensiveness. "Infoglut" and questionable validity were cited as the most common obstacles to finding information. Concern over the amount of time spent locating information was emphasised universally among undergraduates, graduate students, and faculty. The report concludes that aside from personal preconceptions, issues of time and levels of difficulty in obtaining information are usually of more concern to students than issues of accuracy. [US]

11. 'Sense-Making and Synchronicity: Information-Seeking and Communication Behaviors of Millennials and Baby Boomers' (Connaway *et al*. 2008) examines results of two studies that employ a multi-method research design to identify how and why individuals seek and use information; it offers detailed accounts with quotes from students. Results are from focus groups and virtual reference services (VRS) transcripts. The findings suggest a surprising need for mentor guidance in the learner research process. Both 'millennials' and Baby Boomers consistently identify Google and human sources as the first sources they use for quick searches. The younger millennials ("screenagers") consult parents most frequently, while the older millennials consult friends and professors. Boomers consult their personal libraries and colleagues. [US]

12. '"If it is too inconvenient I'm not going after it": Convenience as a critical factor in information-seeking behaviors' (Connaway *et al*. 2011) investigates convenience as a major theme in different information-seeking behaviours, examining both academic information-seeking and everyday-life information-seeking contexts. It concludes that in some situations information seekers will readily sacrifice content for convenience. Convenience includes choice of information source (is it readily accessible online or in print?), satisfaction with the source (does it contain the needed information and is it easy to use?), and the time it will take to access and use the information source. Connaway recommends that in light of this, library systems and interfaces need to look familiar to people by resembling popular web interfaces, and library services need to be easily accessible and require little or no training. [US]

13. 'Beyond Google: How do students conduct academic research?' (Head 2007) reviews findings from an exploratory study about students majoring in humanities and social sciences. Using student discussion groups, content analysis, and a student survey, results suggest students may not be as reliant on public internet sites as previous research has reported. Instead, a majority of students leverage both online and offline sources, gauging professor expectations for quality research. Some findings:

    a. Students use the library and consider library resources (reference librarians, databases) helpful.
    b. A majority of students are not as reliant on search engines as prior research studies have suggested.
    c. Students sparingly used Wikipedia in their research processes.

    Head recommends that research assignments detail expectations for conducting quality research; and that professors and librarians recognise students' needs for individualised coaching. "The value of 'high touch' interactions (human-mediated) with students in addition to 'high tech' interactions (computer-mediated) should not be underestimated." [US]

14. *How College Students Seek Information in the Digital Age* (Head & Eisenberg 2009) bases findings on the 'Project Information Literacy' (PIL) project. The team administered an online survey in the spring of 2009 to 27,666 students at six community colleges and public and private colleges and universities across the US; findings are based on a collective sample of 2,318 responses. They found that respondents employed a consistent and predictable research strategy for finding information whether conducting course-related or everyday research. Almost all students used course readings and Google first; a need for big-picture context, or background about a topic, was the trigger for beginning course-related (65%) or everyday-life research (63%); librarians were tremendously underutilised; nine out of ten students used libraries' online scholarly research databases (e.g. EBSCO, JSTOR, or ProQuest) for conducting course-related research; and today's students clearly favour brevity, consensus, and currency in the information sources they seek. Head concludes that many students have a narrow and inaccurate view of all that libraries offer (i.e. resources available). [US]

15. 'Science on the Web: Students Online in a Sixth-Grade Classroom' (Wallace *et al*. 2000) examines how students in sixth-grade science classes use the web to carry out an inquiry-based assignment and then interact with digital resources. Their understanding and enactment of their assignment, their engagement in information-seeking, and their use of web technologies are all explored and analysed. There is evidence that students use web technologies easily but simplistically; that information seeking is a complex and difficult process for these students, who seek to reduce the task to finding an obvious answer or finding a good website; and that developing students' understanding of content through use of the web is a challenge for students as well as teachers. [US]

16. 'Nurturing Students' Critical Knowledge Using Technology-enhanced Scaffolding Strategies in Science Education' (Shen 2009) examines the student approach to critiquing information, e.g. search results, and asks (among other things) how students' critical knowledge can be

scaffolded and developed using technology-enhanced learning environments; what challenges are involved in developing critique activities in a technology-enhanced environment? The study finds that students naturally, and often unconsciously, utilise a rich set of criteria, and need further guidance and scaffoldings to use these criteria more reflectively and productively. Access to a collaborative community (e.g. discussion boards) may help students develop critical knowledge; other possibilities include creating multimedia objects, providing generic and directed prompts, incorporating a digital library, having an online discussion forum, and offering automated feedback. [US]

5.3.2 'Very relevant' non-OER online resources

These are tagged 'L4' in the online bibliography.

The 17 non-OER items considered 'very relevant' might have appeal to researchers interested in the cognitive aspects of search as a concept, or to librarians curious about students' information retrieval methodology. Data logs are used to compare the behaviour of students to that of other members of the university community, and separate subject-specific studies into the habits of Physics, Nursing and English Composition students are undertaken and reviewed.

1. *Information Behaviour of the Researcher of the Future: The Literature on Young People and Their Information Behaviour* (Williams & Rowlands 2007) examines the literature from a wide range of sources on the information behaviour of young people. A specific aim of the study is to establish whether there has been a change in the way that teenagers (and young undergraduates) approach information, libraries and research. Of major interest is the exploitation of internet search engines and use of portable devices. Various claims are reviewed in light of past studies, e.g. that the Google generation show a preference for visual information over text; that the Google generation want a variety of learning experiences, and are used to being entertained; that the Google generation have zero tolerance for delay; and many more. These reflections comprise the final section of the text but are not a conclusion. [UK]

2. 'Student Searching Behavior and the Web: Use of Academic Resources and Google Survey of Existing Search Engine Use Research' (Griffiths & Brophy 2005) focuses on UK student web searching behaviour to evaluate the UK's national academic sector digital information services and projects. It finds that commercial internet search engines dominate students' information-seeking strategy. 45% of students use Google when first locating information, with the university library catalogue used by 10%. Most users are satisfied that the initial ten or so search results are good enough to answer their information need. Users are rarely interested in a comprehensive high-recall search but rather are satisfied with retrieval of a few relevant hits. [UK]

3. 'Understanding Student Information Behavior in Relation to Electronic Information Services: Lessons From Longitudinal Monitoring and Evaluation, Part 1'(Rowley & Urquhart 2007) establishes a model of the mediating factors that influence student information behaviour concerning digital information sources that support their learning. The review indicates that there are gaps in the evidence concerning the browsing and selection strategies of undergraduate students. The paper reviews other studies on the topic; very theoretical. [UK]

4. 'Information-seeking behaviour of physicists and astronomers' (Jamali & Nicholas 2008) gathered data using a questionnaire survey of 114 PhD students and staff, to find aspects of information-seeking behaviour of physicists and astronomers. Browsing e-journals, searching, conferences, and meetings were the methods on which 93, 85, 83, 78 and 69 per cent of respondents were very or quite dependent. Search email alerts, browsing print journals and e-print email alerts were used as well. Two to three times a week, 40% of respondents use Google to identify research articles, 21% use subject databases and 38% browse or search e-journal websites. 53% track references at the end of articles. 46% of the respondents had never used Google scholar. [UK; Iran]

5. *Online Catalogs: What Users and Librarians Want. An OCLC Report* (Cantrell *et al*. 2009) presents results from a worldwide survey on the subject of searching online for books – yet high-quality data can clearly be extrapolated for OER. 36% of respondents express a desire to see "more links to online content/full text". Focus groups in this study consist of: undergraduates aged 18-24, casual searchers aged 25-59 years old, and faculty and graduate students (called 'scholars'). OCLC formed a research team to (among other things) identify and compare the data quality expectations of library catalogue end users. It finds:

    a. The end user's experience of the delivery of wanted items is as important, if not more important, than his or her discovery experience.
    b. End users rely on and expect enhanced content including summaries/abstracts and tables of contents.
    c. An advanced search option (supporting fielded searching) and facets help end users refine searches, navigate, browse and manage large result sets.

    For 11,151 respondents, responses from librarians/library staff were excluded from end-user data. 68% of responses were from end users, of whom 28% were students (i.e. over 3,000 people). End users indicate that they want: direct links to online content; text and media formats; evaluative content, such as summaries/abstracts, tables of contents and excerpts; relevant search results; item availability information; and simple keyword search with an advanced, guided search option. [International]

6. 'Students' perceptions of collaboration, self-regulated learning, and information seeking in the context of Internet-based learning and traditional learning' (Lee & Tsai 2011) seeks to investigate students' perceptions of collaboration, self-regulated learning (SRL), and information seeking (IS) in both internet-based and traditional face-to-face learning contexts. [Taiwan]

7. 'Online Information Searching Strategy Inventory (OISSI): A quick version and a complete version' (Tsai 2009) seeks to evaluate student online information searching strategies, providing researchers with a valid and reliable tool to evaluate students' self-reflected web search strategies. The OISSI scores of 324 high school students revealed a significant gender difference in both behavioural and procedural domain strategies. The paper reviews various models and previous studies, and is both a bit technical and detailed in relation to learner theory. [Taiwan]

8. 'The land of confusion?: High school students and their use of the World Wide Web for research' (Lorezen 2001) studies the use of the world wide web by high school students to

complete school assignments, via interviews with students. The students in the study used a good variety of resources, including libraries and the world wide web, to find information for school assignments. However, the students were weak at determining the quality of the information that they found on a website. The paper offers an unusual level of detail from the student perspective, e.g. a student discounts a website as unreliable due to perceived "spelling errors" – this turns out to be a British versus American spelling issue. The author finds as well that many students judge the validity of a website by how elaborate it looks. [US]

9. 'Models of Digital Collection Use in a University Community' (Bass *et al*. 2008) is a FIPSE-funded study examining the factors that influence faculty, graduate students, and undergraduate students' creation and use of digital collections. Based on interviews, it presents cases of faculty, graduate students, and undergraduates to illustrate factors that determine why they do or do not use collections. Case studies suggest that postgraduate students questioned the marketability of digital collection use, while undergraduate engagement with digital collections appears to be determined by the level of department support and faculty facilitation, i.e. "the most salient factor differentiating high-end and low-end undergraduate student users appeared to be the extent to which digital collections were used in their courses". This study includes non-academic collections, e.g. YouTube, Flickr etc. [US]

10. 'The Infodiet: How Libraries Can Offer an Appetizing Alternative to Google' (Bell 2004) addresses the declining research ability of students due to overdependence on internet search engines. Bell explores the individuals deemed responsible for students' declining research ability, possible improvements to search systems and interfaces. He also addresses a common student question: "Can't this be more like Google?" Library professionals and the companies that produce the databases do now seem to strive for this, or should. [US]

11. 'Information-seeking behavior of nursing students and clinical nurses: implications for health sciences librarians' (Dee & Stanley 2005) examines research use of digital among other tools. Questionnaires, interviews, and observations are used to collect data from 25 nursing students and 25 clinical nurses to provide new insights into the use of health resources and libraries, and deterrents to their retrieval of electronic clinical information. Nursing students are found more likely than clinical nurses to report performing a database search at least one to five times a week. Participants identify health information resources that they use from nine types of health care resources including human resources, books, journals, databases, handheld computers, internet sites, electronic books and journals, teleconferences or meetings, and drug representatives. Both groups admit that they usually obtain large retrieval lists from internet search engines and often scan the first few retrieved articles; they express frustration at the huge search retrieval lists produced by topic databases, e.g. PubMed; participants unanimously agree that advanced training on such tools is essential. The study also finds that nursing students and clinical nurses prefer human resources (i.e. individual mentors) and 100% consult a human resource at least once a week. 70% of both groups report using print journals at least once a week. [US]

12. ‘Information Seeking Behavior in Digital Image Collections: A Cognitive Approach’ (Matusiak 2006) presents the results of a qualitative study examining user information-seeking behaviour in a digital image collection and interprets them in light of selected concepts of cognitive psychology. A total of 12 users, seven students and five community users participated in the study. It became evident during observation that the participants tended to use one access mode only – either keyword search or browsing – while searching for images. They repeatedly selected the method that initially provided them with results and almost never tried to explore other options. The users who chose the browsing pathways took advantage of visual cues, interacting with the site as if it were an online exhibit. In light of these findings, it is important to index images in the digital collections extensively using both controlled vocabulary and natural language terms. After seeing a number of ‘No results’ screens, users will leave unsatisfied, unlikely to return. [US]

13. ‘How Do You Know That?: An Investigation of Student Research Practices in the Digital Age’ (McClure & Clink 2008) examines how English composition students negotiate locating and using source material, particularly online sources, in relation to timeliness, authority, and bias. It finds that students do not have a strong concern for examining bias in their sources, e.g.: “Mostly, I just picked whatever interested me. If they had a bias, I didn’t really care. I just picked out the stuff that I wanted.” The findings suggest college students rely on information retrieved through search engines, finding online versions of traditional resources. Students include rich and varied information sources in their works cited pages, yet often rely on one (often less than authoritative) source in the texts of their essays. The article examines how to guide student research in this context. [US]

14. ‘Researching the research process: Information-seeking behavior, Summon, and Google Books’ (Medeiros 2009) analyses undergraduate research habits as identified through a study at Saint Mary’s College of California. The paper focuses on Summon, a new federated Google-like search tool from Serials Solutions. The paper suggests that use of library-supplied databases may be increasing due to the ubiquity of full-text, and the ease with which it can be associated with online indexes. [US]

15. ‘Logins and bailouts: measuring access, use, and success in digital libraries’ (Peterson Bishop 1998) examines the nature of access to information resources and the relationship of access to use, allowing us to consider how these alluring visions of easy information availability might be achieved. The team studies how seemingly ‘trivial’ barriers like basic awareness and authentication and registration requirements may deter use of digital libraries. It also finds that subjective factors like system awareness and knowledge that *the system is free and has worthwhile contents* apparently make a substantial contribution to reducing abandoned-access attempts. [US]

16. ‘Reading in a digital age: e-books are students ready for this learning object?’ (Sweat-Guy *et al*. 2007) represents the findings of 261 students’ reported experiences and perceptions of e-books at a historically Black (US) university. 98% of respondents feel comfortable reading shorter texts off a computer screen; 59% will print out longer texts where possible. 55% prefer hard copy to a digital format. [US]

17. 'The Electronic Academic Library: Undergraduate Research Behavior in a Library Without Books' (Van Scoyoc & Cason 2006) studies the University of Georgia's (UGA) electronic library. Undergraduates in this electronic library rely primarily on internet sites and online instruction modules (e.g. Blackboard/WebCT) for their research needs, rather than university-funded research sources. This concept of creating "personal, moveable online libraries" is evident in the popularity of courseware sites used while students do research in the electronic library. Class websites are preferred as a resource by 71.3 % of student researchers, just a few percentage points behind other internet sources in popularity. Academic class status has no significant impact on whether students use either the library's OPAC or the university-funded electronic databases for their research needs. WebCT modules may, of course, include links to online library research sources, in effect creating a "hidden library". [US]

5.3.3 'Relevant' non-OER online resources

These are tagged 'L3' in the online bibliography.
37 references follow as simply 'relevant', addressing use (or non-use) of authenticated content, screen-based reading styles, the idea of 'satisficing' a search query (the intersection of 'satisfying' and 'sufficing'), a look at the 'digital natives' debate – and more.

1. 'e-Learning: The student experience' (Gilbert *et al*. 2007) draws on a student evaluation of an e-learning module on an MSc in Information Technologies and Management, to develop a picture of students' perspective on the experience. [UK]

2. 'The e-textbook gulf' (Bury 2009) examines the JISC e-book study to conclude that students want certain features unavailable in current e-books. [UK]

3. 'Web search behavior of university students: a case study at University of the Punjab' (Amara & Mahmood 2009) explores different aspects of university students' web search behaviour. [Pakistan]

4. 'The 'digital natives' debate: A critical review of the evidence' (Bennett *et al*. 2008) draws on the fields of education and sociology to analyse the digital natives debate. [UK]

5. 'Scholarly journal usage: the results of deep log analysis' (Nicholas *et* al. 2005) looks at the information-seeking behaviour of academics and researchers with regard to digital journal libraries. [UK]

6. 'Trends in Use of Electronic Journals in Higher Education in the UK: Views of Academic Staff and Students' (Bonthron *et al*. 2003) examines disciplinary differences in the use of electronic journals by academic staff and students and considers whether library services need to differentiate between staff and students when planning support services for electronic journals. [UK]

7. 'UK scholarly e-book usage: a landmark survey' (Nicholas *et al.* 2008a) is the JISC-funded UK National E-Books Observatory study, a benchmarking survey of e-book usage and perceptions in more than 120 participating universities. [UK]

8. ‘The textbook of the future’ (Butler 2009) contextualises student use of e-textbooks past, present and future. [UK and US]

9. *The Digital Information Seeker: report of findings from Selected OCLC, RIN and JISC User behaviour projects* (Connaway & Dickey 2010) surveys 12 published user behaviour studies conducted in the US and the UK, to better understand the information-seeking behaviours of the libraries’ intended users. [UK and US]

10. ‘Problem-based learning supported by digital archives: case study’ (Chih-Ming & Chia-Chi 2010) seeks to assess the differences between learning performance and the satisfaction of learners who use digital resources. [Taiwan]

11. ‘Enriching e-learning metadata through digital library usage analysis’ (Ferran *et al*. 2007) proposes an evaluation framework for analysing learning object usage. [Spain]

12. ‘Health Information-Seeking in the Digital Age’ (Percheski & Hargittai 2011) examines the sources of health information among first-year university students and whether the predictors of information-seeking vary by information source. [US]

13. ‘A break in the transaction: Examining students’ responses to digital texts’ (Po & Evans 2006) is a study of students in a university literature course that reviews the student response to the introduction of digital texts. [US]

14. ‘What is enough? Satisficing information needs’ (Prabha *et al*. 2006) reviews ‘satisficing’, the intersection of ‘satisfying’ and ‘sufficing’ for a researcher. [US]

15. ‘Understanding Information Behaviour: How Do Students and Faculty Find Books?’ (Rowlands & Nicholas 2008) reviews a poll of faculty and students at University College London (UCL) as part of a wider investigation into the impact of e-books in UK higher education. [UK]

16. ‘Reasons for the use and non-use of electronic journals and databases: A domain analytic study in four scholarly disciplines’ (Talja & Maula 2003) finds that e-journals and databases are likely to be used most heavily in fields in which directed searching is the dominant search method. [Finland]

17. ‘College students’ misunderstandings about copyright laws for digital library resources’ (Wu *et al*. 2010) investigates college students’ misconceptions of copyright laws, finding that many students treat all information as ‘open’.

18. *Handbook of Distance Education* (Moore & Anderson 2003) is an extensive tome examining various aspects of distance education, e.g. learner-centred theory, content interactions, and (much) more. [International]

19. ‘Students’ use of content in Web-supported academic courses’ (Nachmias & Segev 2003) evaluates how online content is consumed and identifies differences among students in their usage. [Israel]

20. ‘Undergraduates academic information and library behaviors: preliminary results’ (Mizrachi 2010) examines where students begin their research; how they evaluate online sources; what library resources they use; what formats they prefer for reading academic materials; and specific laptop behaviours. [US]

21. ‘Student research behavior: Quantitative and qualitative research findings presented with visualizations’ (Wendling & Johnson 2008) investigates the information-seeking patterns of 650 university students at the University of Maryland-College Park. [US]

22. *Using student-generated notes as an interface to a digital repository* (Harvel 2005) is a dissertation which examines the concept of student notetaking as an interface to a digital repository. [US]

23. *Sense-Making the Information Confluence: The Whys and Hows of College and University User Satisficing of Information Needs* (Dervin *et al*. 2005) reviews how people view their information needs in particular situations; what they are trying to accomplish; and how electronic system features help or hinder their information needs. [US]

24. ‘Out of the mouths of middle school children: I. Developing user-defined controlled vocabularies for subject access in a digital library’ (Abbas 2005) explores the information-seeking behaviour of children in (digital) educational context. [US]

25. ‘Trading Textbooks for Technology: New Opportunities for Learning’ (Nelson *et al*. 2011) analyses a decision based on student user behaviour to embrace widespread use of digital texts. [US]

26. *The Application and Implications of Information Technologies in Postsecondary Distance Education: An Initial Bibliography* (anon 2000) is an output from a 2000 study funded by the US National Science Foundation (NSF); it provides an older bibliography containing numerous student perspective papers from the 1990s. [US]

27. ‘Opening Digital Books (or, Calif. District Pushes Digital-Text Initiative Forward)’ (Ash 2011) details the many ways in which online textbooks can be used e.g. with user notetaking, instant feedback, etc., all within the context of the California digital textbook project (now several years underway). [US]

28. ‘Worries with the Web: A Look at Student Use of Web Resources’ (Grimes & Boening 2001) seeks to determine whether students are using unauthenticated resources and whether they are evaluating their resources; along with whether there is a gap between the quality of resources expected by instructors and that used by their students. [US]

29. *Perceptions of Libraries, 2010: Context and Community* (De Rosa *et al*. 2011) provides insights into information consumers and their online habits, preferences, and perceptions; includes a section on university students. [US]

30. ‘Children’s Relevance Criteria and Information Seeking on Electronic Resources’ (Hirsch 1999) explores the relevance criteria and search strategies primary school children apply when searching digitally for information in a school library setting. [US]

31. 'Research on Web search behaviour' (Hsieh-Yee 2001) reviews studies on web search behaviour conducted between 1995 and 2000. [US]

32. *E-Journal User Study: Report of Web Log Data Mining* (Keller *et al*. 2002) is a very technical report on ways to extract user e-journal data from data logs; it does contain several superb findings, e.g. "Individuals often request PDFs for printing/archiving after reading full text in HTML". [US]

33. 'The adoption of university library Web site resources: A multigroup analysis' (Kim 2010) categorises users based on academic roles and then analyses them as subgroups to observe adoption patterns across groups. [US]

34. 'Reading behavior in the digital environment: Changes in reading behavior over the past ten years' (Liu 2005) investigates reading behaviour in the digital environment, analysing how it has changed over the past ten years. [US]

35. 'Making Sense of Credibility on the Web: Models for Evaluating Online Information and Recommendations for Future Research' (Metzger 2007) summarises the skills internet users require to assess the credibility of online information. [US]

36. *Digital Media, Youth, and Credibility* (Metzger & Flanagin 2008) looks at youth audiences and experiences, considering the implications of wide access and the questionable credibility of information for youth and learning. [US]

37. 'Diversity in the Information Seeking Behaviour of the Virtual Scholar: Institutional Comparisons' (Nicholas *et al*. 2007) uses deep log analysis methods to compare and contrast the information-seeking behaviour of users. [US]

5.4 Overall findings

5.4.1 Findings categorised by HEA headings

These are the headings taken from the Invitation to Tender.

1. Learners' rationale for searching for online resources

OER: We found no meta studies of students' motivation for searching specifically for OER resources. However, there are a number of surveys of individual OER projects – some of which (such as Carson's MIT surveys from 2004 to 2009) are of sufficient scale and longitude to be of particular interest:

- Of *students* using OER, 44% said it was to enhance personal knowledge, 39% said it was to complement a course and 12% said it was to plan a course of study.

- Of *self-learners* using OER, 41% said it was to explore interests outside of the professional field, 20% said it was to plan future study, 17% said it was to review basic concepts in their field and 11% said it was to remain current in their field. (Carson 2009)

The Open Universiteit Nederland (OUNL) OpenER project was aimed specifically at those who had not "successfully attended higher education" (Schuwer *et al*. 2007). Reasons given (respondents were allowed more than one choice) for visiting the site were:

- to follow a free course: 64%;
- to test if they are able to cope with university courses: 23%;
- to try out different domains: 38%;
- to try out a study at the Open Universiteit Nederland: 43%;
- to use the material in their own courses: 5%. (Schuwer *et al*. 2007)

Slightly less identifiable as the 'rationale' for visiting but still of interest is the student ranking of The Open University's Open Learn (Godwin and McAndrew 2008) features. Godwin and McAndrew say their findings suggest that while some learners seek stronger communication tools, there is a need to refrain from promoting social networking as desirable to all learners. Perhaps key among their conclusions is that consideration should always be given to providing links to assessment and accreditation. Responses in order of importance to students are as follows:

1. a large choice of content;
2. to have ways to test and assess my learning;
3. interactive content e.g. quizzes, interactive diagrams etc.;
4. question and answer sessions with experts;
5. images and graphics;
6. video clips;
7. news items;
8. audio and podcasts;
9. facilities to create personal space;
10. to be able to interact with other learner.

Arendt and Shelton (2009) survey all Utah residents (as opposed to learners) but their views of incentives and disincentives for using OCW are of some relevance here.

The greatest incentives are the following:

- no cost for materials;
- resources available at any time;
- pursuing in depth a topic that interests me;
- learning for personal knowledge or enjoyment;
- materials in an OCW are fairly easy to access and find.

The greatest disincentives are:

- no certificate or degree awarded;
- does not cover my topic of interest in the depth I desire;
- lack of professional support provided by subject tutors or experts;
- lack of guidance provided by support specialists;
- feeling that the material is overwhelming. (Arendt and Shelton 2009)

It has to be said that the learner-focused studies above are of either a US elite university's offerings or open universities (even though non-OU students were also surveyed) – with a strong focus on informal learning. There is a clear need to have more research on student experience of formal learning using OER at campus-based universities in the UK.

Non-OER: The non-OER literature surveyed typically addresses the search for online resources in relation to isolated research tasks performed within a traditional course context (e.g. to complete one's homework or perform an isolated in-class task), and thus motivators are considered in this light.

This is consistent with the general belief among experts that student learning is substantially driven by assessment, perhaps increasingly so with full-time students at campus universities (it has been true for part-time students at open universities for many years).

'Research content' is moreover typically seen as a source for assignments, with students' perception of research very much led by the context of their assignments (Hampton-Reeves *et al*. 2009). Some authors suggest that, in light of this, research assignments should include details about expectations for conducting quality research (Head 2007).

In one study, students identified a need for big-picture context, or background about a topic, as the specific 'trigger' for beginning their course-related research (Head & Eisenberg 2009).

More generally, students' rationale for seeking *online* resources over other options boils down to ease of use/access (i.e. anytime, anywhere); efficiency; and streamlined searchability (i.e. ability to search thousands or even millions of resources at once). It is generally taken for granted that the contemporary student's research projects will begin with a simple Google-type search for online resources.

2. Types of online resources being sought e.g. journal articles, multimedia

OER: We note above that the JISC/HEA OER projects encompassed a wide range of formats from simple text through to video and simulations (and, indeed, the student preference for audio over video in the OpenSpires project). This is reflected in the wider research – although, once again, it would appear that the desire to *provide* OER means that this has initially been driven by the *supply* side and rarely, yet, in response to learner preferences. However, this should not undermine the value of the student surveys – in fact, considering the dearth of research concerning this, these studies possibly assume greater importance.

The University of Oxford 'Listening for Impact' research (also a JISC-funded study) into podcasting (Geng *et al*. 2011) found that the resources produced were popular among students and external users (learners and teachers) alike. This popularity was growing considerably (from 7% who had listened to podcasts from the Oxford portal in November 2010 to 33% in February 2011) and is expected to continue on an upward trend. Students reported that they particularly valued the podcasts because the lectures were 'related' to their own course or subject, that they had supporting resources linked and that they could be played in-line (i.e. in the location where they had been accessed/discovered). This is confirmed by presentations at MELSIG events over the last two years.

The podcasts were made available via iTunes, and Geng *et al*. (2011) noted the significant external influence exerted by Apple, e.g. the boost when iTunes entered new educational markets such as China, or disparities between owners and non-owners of Apple devices.

In the US, OER videos from the Kahn Academy were used to explain to students the Sub-Prime Lending Crisis and the collected student responses demonstrated very high levels of satisfaction with the assignment. It should be noted that the videos that comprise the Kahn collection are relatively short (10-20 minutes) and are designed to be appropriate for students to view on a computer; they are not full-length lecture videos (McDowell 2010).

Non-OER: Findings suggests that today's learners utilise numerous types of OER and non-OER media:

- Wikipedia articles (Field 2006; Luyt *et al*. 2008; Lim 2009; Chandler & Gregory 2010; Menchen-Trevino & Hargittai 2011; Clark *et al*. 2011) – quite common[71];
- websites (Dee & Stanley 2005; Van Scoyoc & Cason 2006) – very common;
- e-journal articles (Keller *et al*. 2002; Bonthron *et al*. 2003; Dee & Stanley 2005; Jamali & Nicholas *et al*. 2008b; Nicholas *et al*. 2006; Nicholas *et al*. 2009; Nicholas *et al*. 2011) – common at undergraduate level and above;
- e-books (Sweat-Guy *et al*. 2007; Grudzien & Casey 2008; anon 2009; Jamali *et al*. 2010; Rowlands & Nicholas 2008; Wong *et al*. 2010) – increasingly common at undergraduate level and above, especially in the UK;
- iTunes U podcasts (Woods 2009; Drexler 2010; Brownell 2011; Geng *et al*. 2011; Siebarth 2011) – extremely common for informal learning;
- videos, e.g. Khan Academy/YouTube (Johnson *et al*. 2010; Wong *et al*. 2010; Winn 2010; Brownell 2011) – extremely common for informal learning;

[71] As a rough cross-check, an attempt to search for references to 'learner use of Wikipedia' generated 66 hits – although some are out of scope (e.g. being about machine learning) – see http://scholar.google.co.uk/scholar?as_q=wikipedia&num=100&btnG=Search+Scholar&as_epq=&as_oq=student+learner+learning+pupil+classroom&as_eq=&as_occt=title&as_sauthors=&as_publication=&as_ylo=&as_yhi=&as_sdt=1.&as_sdtf=&as_sdts=5&hl=en.

- images (Matusiak 2006; Rightscom 2006).

3. Complexity/granularity of resources being sought

OER: In section 5.1.2 we note the apparent tensions and contradictions in relation to the granularity that may be sought by students, and the need for contextualising and the 'pedagogic wrapper'. This is reflected throughout the wider research. Lane's studies of OpenLearn led him to conclude:

> *The effectiveness of open educational material is usually improved where there is a clear sense making structure, a narrative which relates to explicit learning outcomes. It also helps to have formal or informal assessment tasks or learning activities linked to those learning outcomes. A single image or video clip will usually lack an explicit narrative or learning outcome and therefore places much greater demands on the user to construct their own narrative and implicit learning outcomes without the help of a mediator (teacher)..* (Lane 2007)

This is supported by the findings of the University of Nottingham team, which looked at reusable learning objects for health studies. While they acknowledged that increasing the 'specificity' of the objects can significantly reduce the potential for reuse, they found that this was a necessary trade-off. They also stressed the need for *consistency* of resources and that this was crucial to learners – and to whether learners would reuse or share the objects with peers. The need for context and consistency is seen as particularly important in health studies, where the potential consequences of "objects in the wild" being used incorrectly or out of context are clear (Windle *et al*. 2010).

At the OUNL it was found that the OpenER courses were considered of much greater appeal if they contained not simply content but also "learning guidance and exercises" and if they could be completed with a test or exam (Mulder 2007)[72]. Students (and/or potential students) viewed these aspects as supporting their learning but also as representative of the possible challenges ahead and, consequently, a true trial of whether they have the ability to cope with this educational level.

Findings from a small-scale study (just four users) in what is a new field of research (remote observation) should be treated with some caution. However, San Diego & McAndrew's use of eye-tracking and remote observation to follow users of an OpenLearn unit revealed some areas for future investigation.

> *By analysing user interactions based on visualisations of logs triangulated with users' utterances, the evidence suggests that although an OpenLearn unit may have been designed to follow a certain pedagogic sequence, logs show users may not follow the same sequence. For example, the two users in this research 'jumped' to the webpage where the assessment questions are. It seemed that the users performed some sort of 'answer searching' strategy.* (San Diego & McAndrew 2009)

[72] Conversations with academics at Lund University suggest that they would support this view. For very recent information on OER in Sweden see 'Opening Pandora's Box: Conclusions from a Swedish OER project', presentation at the EDEN conference June 2011, http://www.slideshare.net/alacre/eden2011-8319582.

Non-OER: Research findings suggest that users are typically seeking a single item per search unit of effort, e.g. the factual answer to a question; a single journal article; an image or video, etc. The complexity of the resources sought increases with age or educational level. Children in particular will seek to reduce the task to finding a single obvious answer or good website (Wallace *et al*. 2000); while a PhD student might look for a subject portal, a citation database, or an entire MIT OCW course (Rightscom 2006).

Informal learners of any age are more likely to seek a simple resource, e.g. a Khan Academy video.

4. How resources found are used e.g. for revision purposes, as evidence for assessment purposes, to enhance understanding

OER: Following on from the findings at 5.4.1.3 above concerning the reasons why students (or prospective students) responded well to OER that were contextualised and had assessments in-built, Lane *et al*. found similar evidence that users appreciated:

> *... the chance to dip in and take bits out of courses without having to worry about doing the whole thing.* (Lane *et al*. 2009)

They also found that these users, and indeed others who were already OU students, also valued the opportunity to make contact with peers. Notwithstanding the caveats above with regard to "social networking" (Godwin & McAndrew 2008) it appears that some students use OpenLearn as an additional communication tool. The resources may initially draw them in but they then have access to a new group of peers (Lane *et al*. 2009).

Wilson surveyed students prior to OpenLearn starting, with responses revealing a hunger for assessment (90%), qualifications (89%) and tutorials (64%) (Wilson 2008).

The Open Nottingham Project surveyed undergraduates about how they had used the repurposed geographical data handouts – with 67% saying to better help them understand the topic, 56% as a revision resource and 44% reporting they had "cited them in an assignment" (Stapleton *et al*. 2011). With specific regard to podcasts, the Listening for Impact survey found that the resources were considered of most use to catch-up when a lecture had been missed, to stimulate interest in that subject and/or as an aid to revision (Geng *et al*. 2011).

Non-OER: As noted, the articles surveyed typically frame research in the context of a single assignment that requires factual information for completion. Data gathered are therefore assumed to have been applied to both enhancing understanding and carrying out an assigned research task (with sources cited).

However, a handful of publications focus on 'scaffolding' and classroom activities to enhance and nurture knowledge acquisition. Among strategies mentioned are computerised assessments; group discussion forums and collaborative wikis (Abbas 2005; Shen 2009).

Medical and nursing students also apply knowledge gained 'on the fly', e.g. with patients with whom they interact that day or week (Dee & Stanley 2005).

5. Whether learners in some subject areas appear to conduct more searches for online resources than others

OER: We found no substantial studies of disciplinary difference with regard specifically to OERs. However, the findings below for Non-OER may well have considerable read-across.

Non-OER: Prefacing their report of Caledonian University Engineering and Social Work students Margaryan *et al*. (2011) note that previous studies into technology use by students have shown considerable variations with higher usage among technology and business studies students and lower among the arts, languages, social and healthcare. However, they counsel caution in analysing this data since they are concerned with what are now increasingly redundant technologies such as CD-ROMs.

The Caledonian study supports the view that the 'digital natives and digital immigrants' thesis may distort perceptions of students and that a much more nuanced discussion is now required. It would appear from the study that there may still be some distinctions between younger and older students but that these must be seen in much wider contexts:

> *In summary, students studying a technical discipline and 'digital natives' used more technology tools than students' from a non-technical discipline and 'digital natives'. Furthermore, 'digital natives' and students of a technical discipline used more technology tools in formal and informal learning and for recreational purposes when compared to 'digital immigrants' and students of a non-technical discipline. This relationship may be further mediated by the finding that university courses for technical disciplines provide and require more intensive and extensive access to technologies (VLE).* (Margaryan *et al.* 2011)

Surveys of student search behaviour is examined elsewhere within single subjects (e.g. Physics, Nursing and English Composition), but not in a comparative – or quantitative – context (Dee & Stanley 2005; Jamali & Nicholas 2008; McClure & Clink 2008).

6. Educational level of resources being sought e.g. HE undergraduate level; postgraduate

OER: Most of the more substantial studies have concentrated on undergraduates, or the use of undergraduate-level materials to engage non-traditional students. Across the research the findings are generally consistent with those below for non-OER resources.

There is a need to do some more research on postgraduate courses.

Non-OER: We find evidence that users of all levels are (on a basic level) engaged in nearly identical search methods despite their differing requirements as learners – that is, commencing with a simple Google search. Studies trace the search patterns of students as young as primary school age, as well as those of PhD students, and all levels of resource are pursued along the way. As undergraduate students are the subject of most studies located in this literature review, though, in this case the majority of resources being sought are indeed at the undergraduate level. The next most common set is postgraduate (Masters); followed by primary school; secondary school; and finally PhD. Secondary school students are capable of absorbing data targeted at a variety of educational levels, increasing the appeal of university resources.

We have also reviewed many studies asserting that high-level postsecondary students do spend a good deal of time in search of journal articles (Nicholas *et al*. 2006, 2009, and 2011); these would presumably be considered 'postgraduate' resources (or beyond).

7. Location of resources most likely to be used e.g. UK HE, international, non-HE

OER: As explained above, this study has focused largely on English-language papers and thus often deals with education in the English-speaking world (and largely on higher education). This will clearly have an influence on where the resources are used. The vast majority of resources that we have reviewed (via the papers on them) have been hosted in the US and the UK.

McAndrew *et al*. (2008) reported that access to OpenLearn had been "truly global" with domain of access from 225 countries/territories. UK access over the duration of the two-year period was approximately 30%. The 2009 annual MIT survey (Carson 2009) illustrated a similarly international perspective with 54% of the traffic coming from outside of the US (17% from East Asia, 11% from Western Europe, 9% from South Asia, 4% from Latin America and 13% from other regions).

Podcasts created and released for the Listening for Impact project at the University of Oxford were accessed, and in some cases reused, by listeners from around the globe including those in Sweden, Norway, Brazil, the US, Canada, China, Korea, and New Zealand. Feedback received indicates that these listeners came from a broad spectrum of backgrounds from the professions (education, law, medicine) to current students and retired lifelong learners (Geng *et al*. 2011). The project was seen as particularly successful in attracting students 'new to Oxford' and provided rare (albeit) anecdotal UK evidence of such OER forming a bridge with the UK compulsory sector when a head teacher wrote:

> *I hope you'll be pleased to hear that your podcasts on approaches to Shakespeare are being very much appreciated. As head of More Able and Talented at a large state school, I am constantly looking for resources to improve our teaching and your podcasts are giving us just that opportunity. Members of the English department are now using Wittgenstein's Dabbit illustration in the way you did and finding it to be a very effective approach and our more able students are being encouraged to listen to the podcasts both to improve their understanding of the plays and to encourage them to believe that the Oxford is not a rarefied and unattainable target, but operates at a level they will find accessible. Beyond that I and an increasing number to whom I have been recommending the site have really enjoyed the lectures.* (Geng *et al*. 2011)

Higher education institutions are without a doubt the most common repositories of open educational resources. Given the population and number of universities in the US – and the breadth of the OER activities now underway in that country, e.g. OpenCourseWare, Hewlett Foundation and US government initiatives – across the educational and public sectors, it seems likely that most resources are hosted in the US.

On the other hand, in relation to general penetration of OERs in an *organised* effort across the entire higher education sector, the UK would be in the lead.

However, since many students seem now to use Wikipedia articles in their studies (not to mention YouTube etc.), the concept of 'which country' an item is hosted in is rather elusive.

Non-OER: Since many postsecondary students use (via automatic authentication) full-text journal articles from a wide variety of publishers and repositories, the issue of the host country for such material is not clear, nor – we suspect – of great interest to students.

8. Extent to which resources are the principal or a supplementary source of learning materials

OER: As noted previously, accurate tracking of OER use is fraught with challenges – a few of which have been addressed by project teams and thus providing findings for this report. However, from the existing research this question remains nigh on impossible to answer with any certainty or clarity. OER range from the smallest level of granularity to entire course modules or courses. These may be used in a variety of ways depending on the context of the learner (see above on 'How resources found are used e.g. for revision purposes, as evidence for assessment purposes, to enhance understanding'). In the majority of studies we have considered, the OER have apparently been *designed* as supplementary materials – which may not be the same as how they have been *used*.

For an investigation of OER as the *principal source of learning* materials see the Carnegie Mellon OLI (Lovett *et al*. 2008) below[73].

Non-OER: The research literature we have analysed seems silent on this topic but it is known that for at least ten years there have been online courses (and not only at open universities) where online resources form the *principal* source of learning materials[74]. At Masters level, again there have been courses from the 'constructivist' era (well before the OER era) where generally available resources were used, usually together with a substantial amount of student-student and student-tutor interaction.

In other words, this question is really about how online courses are developed and received by students. There is an extensive literature on this, including many papers from open universities, quite separate from the material we surveyed.

9. Whether or not learners are in formal education

OER: It is difficult to make an accurate assessment since one of the driving forces for the institutions (or perhaps the individuals) involved in OER creation and release is to broaden participation – particularly among non-traditional learners. Hence, a number of the projects and their associated studies have been designed with this purpose as either the primary focus or an integral component.

The OpenER at OUNL was one such project but it is still noteworthy that 43% had not participated in higher education before; 75% of the survey respondents were at the time not involved "in any formal learning trajectory"; and – exploring a separate issue – 60% were female (Schuwer *et al*. 2007). At MIT 43% of visitors describe themselves as "self-learners" (as opposed to students or educators) (Carson 2009).

[73] There is also anecdotal evidence of substantial use of OER in postgraduate courses in Sweden. See the interesting paper 'From Microtraining and Open Educational Resources (OER) to Master Courses on Geographical Information Systems (GIS)' summarised at http://www.lunduniversity.lu.se/o.o.i.s?id=12683&postid=1482680.

[74] For one contemporary example, see P2PU (http://p2pu.org/en/).

In the earlier period at OpenLearn the dominant age group was 35-54 year olds. Other characteristics of the visitors included 'well-educated' and 'confident'. Many already had an 'existing connection' with the OU (Godwin 2008).

Of course it seems often to be the case that learners may be in formal education 'somewhere' but not necessarily at the institution providing the resources. It is not often realised in the UK how common it is in some countries with well-developed credit transfer systems and per-credit student support loans (US and Sweden in particular) for students to be taking courses from several institutions simultaneously[75]. (There are downsides to this phenomenon too – in particular for retention – but that is another story.)

Non-OER: Interestingly not one paper in our corpora uses the phrase 'informal learning' in its title, but one mentions it in the abstract: Escoffery *et al*. (2005) – see below. The overwhelming majority of users examined in this review's studies were indeed in formal education, at levels ranging from primary school to postgraduate (with an emphasis on postsecondary education e.g. college or university).

The group next most commonly studied is university faculty and staff, followed by professional researchers and then medical/health professionals; these last few are typically in search of journal articles to help them 'keep up' with their colleagues, or address real-life medical issues (Dee & Stanley 2005; Rightscom 2006).

This applies to students too. Escoffery *et al*. (2005) reported the (to some, alarming) statistics that:

> *Overall, 74% of the students reported having ever received health information online, and more than 40% reported that they frequently searched the Internet for [health] information.*

10. Enablers and barriers to use of online resources

OER: The enablers of OER are rehearsed throughout this section and section 5.2.5. It remains true across the wider research that most of the barriers to the use of OER are either the same as or a consequence of more generic barriers to *accessing and using technologies for learning* and we address these below. However, the issues of designing learning for the 'unknown user' and the tensions between granularity and the need for scaffolding permeate much of the research – even if they do not achieve the profile we may have imagined.

> *In its (OER) current level of deployment, however, does it necessarily support 'meaningful learning'? There are several interlinked issues related to completeness of content, granularity, copyright, offline access, use, etc., that sometimes limit the effectiveness of material provided. Therefore in order to support the learner we need to understand and support their individual learning environment, which is often offline. Furthermore, we need to understand the learner's limitations in terms of content*

[75] In a recent study we did for a client on 'library support for distance learning' one manager at a prestigious Canadian university active in distance learning reported, in connection with podcast lectures, that "he welcomed other universities providing OER because it was saving money on his course development budget".

> *selection, access, use and management of their personal knowledge silos on their desktop.* (Esslemont 2007)

The issue of copyright and provenance is dealt with below.

Non-OER: Our non-OER literature review identifies numerous enablers and barriers to use of online resources. An obvious enabler is access to simple search engines like Google, directing users to simply displayed results. This accommodates what is seen as a contemporary learner preference for quick fact extraction and brief viewing, as opposed to continuous reading, as noted by the e-Books Observatory (anon y 2009). Today's students favour brevity, consensus, and currency in the information sources they seek (Head & Eisenberg 2009); resources easily accessed, interacted with, and departed from make all the difference. In essence, today's young learners have often expressed a desire that digital libraries should, generally speaking, be "more like Google" (Bell 2004).

Conversely, young people are seen to rely overly heavily on search engines, to "view rather than read", and to be lacking the critical and analytical skills to assess the information that they find on the web. In this sense they are not truly "web literate" (Nicholas *et al*. 2008b). A lot of students use Google but are bewildered by the number of responses it generates, and will rarely look beyond the first few pages of search results (Hampton-Reeves *et al*. 2009); hence any website that asks them to engage deeply feels disruptive to their learning (Nicholas *et al*. 2006). Connaway *et al*. (2011) find that in some situations, information seekers will "readily sacrifice content for convenience"; issues of time and levels of difficulty in obtaining information are usually of more concern to students than issues of accuracy (Weiler 2005[76]).

A surprising number of authors point out that today's student is more amenable to "the human touch" than is typically presumed (Connaway *et al*. 2008; Hampton-Reeves *et al*. 2009). Guidance in search methodology, personalised training sessions, and uses for 'human resources' (i.e. mentors, tutors, even parents) as key enablers are recommended by numerous authors – though several note an intriguing reluctance by students to work with librarians in particular (Head & Eisenberg 2009).

On the other hand, an oft-identified barrier is publishers' embargoes on various materials; students are frustrated when a promised resource is suddenly unavailable, and lose trust in the resources they are using (Wong *et al*. 2010). There is also evidence that a single bad experience, e.g. 'no results found', with a resource can put a user off it permanently (Matusiak 2006).

11. How learners retain access to the resources: downloading copies, bookmarking, 'favouriting' etc.

OER: The only systematic study of how learners *retained* access to the resources (away from the JISC/HEA Programme where we noted that in some cases learners preferred to *access* them through the institutional VLE) appears to be Lim's study of Wikipedia. (We take Wikipedia here to be an OER *and* a source of OER.) In Lim's study Wikipedia was used more frequently (for accessing resources) than library databases – which comprised the smallest frequent user group (Lim 2009).

[76] Not Weller.

However, slightly more than half of the respondents accessed Wikipedia through a search engine, while nearly half accessed it via their own bookmarks. This supports the view that Wikipedia is also an established *source*.

> *In other words, Wikipedia's popularity is attributed to both search engines and its obtaining recognition as a useful source.* (Lim 2009)

Non-OER: Students have various approaches to this issue.

Some still like paper: several contemporary surveys show that, if given the option, students will opt to print out longer texts (Sweat-Guy *et al*. 2007).

Some students like to use a web browser's tabs as an organisational tool. They may then bookmark their findings, or copy and paste them as notes into a Word document; email items to themselves; etc. Some use more sophisticated features such as RefWorks, EndNote, etc. (Wong *et al*. 2010).

12. Provenance information and copyright status of resources being used and learners' awareness of this

OER: Much of the wider research backs up the findings in 5.1.2 with regard to the students' perhaps inconsistent attitudes to provenance. Just as in the JISC projects, the experience of the OUNL OpenER resources is overwhelmingly that students expect the courses to be of a suitable academic level and that the university is the guarantor of quality. Elsewhere (and this is true of the non-OER studies mentioned below), many students seem content to take on trust the validity of resources found on the web. Lim's study of students' use of Wikipedia suggested that students tend to use it for rapid fact checking and background information, and that they had generally had good experiences of it as a resource. However, their perceptions of it its 'information quality' did not reflect this.

> *... it appears that the uneasiness associated with the anonymous authorships of Wikipedia has led to non-expert users' underestimation of the reliability of Wikipedia, which has apparently affected their perceptions of information quality. This is, indeed, a very interesting phenomenon regarding Wikipedia.* (Lim 2009)

It is out of scope for this research but worth noting the *OER IPR Support Project* (funded by the Higher Education Academy and JISC, and delivered by JISC Legal, Web2Rights and Creative Commons UK) to give OER Phase 2 projects support and guidance relating to intellectual property rights, and other legal issues[77].

Non-OER: Menchen-Trevino & Hargittai (2011), Hampton-Reeves *et al*. (2009), and others examine this issue as well, finding that students are not generally sophisticated in their understanding of things like peer-review or currency: "there is a common view that if something is published it must be reliable" (Hampton-Reeves *et al*. 2009). Lorenzen (2001) finds that students are weak at

[77] See http://www.jisclegal.ac.uk/Projects/OERIPRSupport.aspx.
There is also a useful discussion of Creative Commons elements in 'collective works' (such as university courses) at http://learningspaces.org/n/files/strategically_ranked_OER_collections.pdf.

determining the quality of the information that they found on a website, and may in fact judge the validity of a website based on 'how elaborate it looks'. In a study analysing young adults' credibility assessment of Wikipedia, a few students demonstrated in-depth knowledge of its editing process; most had some understanding of how the site functions; but a few lacked even such basic knowledge as the fact that anyone can edit the site (Menchen-Trevino & Hargittai 2011).

5.4.2 Other findings

A. How do learners search for/discover online resources?

As with much of the thematic analysis of OER, the literature here militates against comparative study – possibly even more so here. The key variables concern whether the users of OER are already informal learners, enrolled students and/or whether they have been directed to resources by lecturers.

The 2009 Carson MIT survey reports that 41% of visitors come via search engines, 28% of visits are direct traffic, 14% come from MIT's own website and 17% are from other referrers (Carson 2009). In the Open Nottingham project survey, 35% of respondents said they had previously used OER and, of these, 67% had found resources through browsing, 56% had used a search engine, 33% had been told of the resources by lecturers and 6% were from peer recommendations (Stapleton *et al*. 2011).

There was some evidence in JISC projects that Twitter may be a useful tool for disseminating information about OER (Stannard 2010) and elsewhere The Open University has had some success with using RSS feeds to publish disaggregated content and individual assets from both MIT OLI and OU OpenLearn. A key advantage cited is the wide range of existing tools capable of interacting with RSS feeds.

B. Do OER influence selection of courses or institutions?

While the studies were often, of necessity, small-scale and relatively short-term (when the initial reports were published) there was evidence from some JISC projects that availability of OER content was having a positive influence on students' choice of course – in cases such as the University of Westminster MSc in Multimedia this was seen "strong" and, if integrated into the institutional marketing strategy, has the potential to yield immediate returns (Stannard 2010).

Elsewhere, evidence on a more significant scale is presented by the MIT OCW initiative where 35% of 'freshmen' said they were aware of OCW before making the decision to attend MIT and had been influenced by its availability (Carson 2006, 2009).

It is believed that many institutions including open universities are interested in this aspect[78]. It is obviously particularly relevant for educational sectors where there is an open market in courses – so far in the UK this has been postgraduate and (to a large extent) part-time programmes. However, if an open market were soon to open in part of the full-time undergraduate programme, perhaps for better-qualified students (arguably also better able to consume OER without much supervision), the effect could be transformative.

[78] See several speeches and presentations including http://olnet.org/node/189.

C. Do OER have an impact on students' attainment?

This is a very hard question even without the issue of OER, and the 'no significant difference' debates are as intense as those over the 'digital natives' issue. There are some useful websites giving general background on this[79] and in the UK it was a subtext to the Pathfinder and Transformation initiatives in England and Scotland respectively[80]. To some extent (and the extent is debated) these initiatives were informed by US work on Academic Transformation and Program Redesign[81], which later found other routes into the UK (again, to an extent that could be debated[82]).

Similar strands led into several large US universities. The Open Learning Initiative at Carnegie Mellon began in 2002 and, as such, is one of the few OER programmes of sufficient maturity and stability to test the impact on student learning. OLI undertook three studies of the Statistics course with the aims of a) investigating whether students could learn as much from stand-alone OER course as a 'traditional' instructor-led course and b) investigating the potential for accelerated learning using the OER course in 'hybrid' mode. The studies involved 'class size' groups measured against peer control groups over a single semester Statistics course.

The results demonstrated that the students working on the stand-alone OER course achieved almost identical scores to those on the traditional instructor-led course and outperformed the national average – thus meeting the 'no harm done' test. The accelerated learning study revealed that the students using the hybrid model learnt 15 weeks' worth of material 'as well or better' than the traditional learners in just eight weeks. Both groups of students were shown to have spent the same amount of time *actually studying* and retention of knowledge was roughly equal – with perhaps a slight edge to the hybrid learners group. On all other measures the hybrid group were at least the equal of the traditional learners.

The researchers suggest that the reason for this accelerated learning is that (due in no small part to the OER course design) the OER learners engaged more meaningfully with the materials, used their time more effectively and were better prepared for the classes (Lovett *et al*. 2008)[83].

D. Numerous studies identify university libraries as a critical conduit to digital resources

Here we highlight just a few of the papers identified that draw this conclusion:

- Libraries guide e-book selection and retrieval (anon 2009).
- Undergraduates and postgraduates are the most likely users of university library links to access scholarly databases, suggesting an important 'hot link' role for libraries (Nicholas *et al*. 2009).
- Students are very reliant on library catalogues (Hampton-Reeves *et al*. 2009); students use libraries often, and consider both reference librarians and library databases extremely helpful (Head 2007).

[79] http://www.nosignificantdifference.org/

[80] http://elearning.heacademy.ac.uk/weblogs/pathfinder/?p=291 and http://www.jisc.ac.uk/elearning_sfc.html.

[81] http://www.thencat.org/

[82] For some of the background see 'CAPITAL Horizon Scan: ORGANISATIONAL CHANGE – FIRST REPORT' by Bacsich & Pepler, http://www.lsri.nottingham.ac.uk/capital/Yr1/HorizonScans/HS1%20Organisational%20Change.pdf.

[83] Candace Thille (the Director of OLI) and some of her colleagues have spoken in the UK on several occasions – see e.g. http://cloudworks.ac.uk/user/view/60.

- Nine out of ten students in one study turned to libraries to conduct course-related research via online scholarly research databases (e.g. EBSCO, JSTOR, ProQuest) (Head & Eisenberg 2009).

E. Learners are found to be predictable in their choice of digital resources, and to rely on tools that have worked for them before (often to the exclusion of experimenting with new ones)

Insights in this area were surprising and noteworthy:

- Knowledge that [a] system is free and has worthwhile contents apparently makes a substantial contribution to reducing abandoned-access attempts (Peterson Bishop 1998).
- Resource selection is based on prior knowledge and experience, e.g. a belief that resources provided by Google and Google scholar are reliable and relevant (Wong *et al.* 2010).
- Respondents employ a consistent and predictable research strategy for finding information, whether they are conducting course-related or everyday-life research (Head & Eisenberg 2009).
- Students repeatedly select the method that initially provided them with successful results and almost never try to explore other options (Matusiak 2006).
- Preference for digital tool types is predictable by gender/age (anon 2009).
- Subject matter can be correlated to preferred digital learning tools (Pan *et al*. 2006).

F. Almost everyone starts with Google; and wants their digital library to be more like it

These two points would be made clear by even a brief survey of the relevant literature, some of which is highlighted here:

- Commercial internet search engines dominate students' information-seeking strategy. 45% of students use Google when first locating information, with the university library catalogue used by 10% (Griffiths & Brophy 2005).
- Almost all students use course readings and Google first for course-related research (Head & Eisenberg 2009).
- More experienced researchers link to publication gateways via Google/Google scholar, then stay on a journal site only long enough to collect the article (Nicholas *et al*. 2011).
- Libraries need to offer 'Google-like' availability (i.e. be open 24 hours a day) and familiar search modes to meet user expectations (Connaway *et al*. 2011).
- End users want: direct links to online content; text and media formats; evaluative content, such as summaries/abstracts, tables of contents and excerpts; relevant search results; item availability information; and simple keyword search with an advanced, guided search option.
- Use of library-supplied databases may in fact be increasing due to the ubiquity of full-text, and the ease with which it can be associated with online indexes (Medeiros 2009) – in other words, the library is becoming more like Google.

6. Conclusions, implications, recommendations

Our findings have been dealt with in the last section. *In a nutshell, there is still a great deal to be researched about learner views and use of OER and online resources generally*. This is especially the case in the UK.

However, there are other gaps in the research that our work has uncovered:

- Several (indeed, many) of the JISC/HEA OER Projects have a stated intention to evaluate/assess/analyse learner experiences and attitudes, but the vast majority (understandably) regard this as a 'next step'. The relative immaturity of the projects is usually given as the reason. It may be different in Phase 2 but this study closes before most of the OER Phase 2 reports are produced. Thus with the exception of work on OpenLearn there is still a large gap in the UK on learner experience work related to OER, especially in relation to larger-scale studies (OTTER being one obvious exception).

- The situation is rather better when one moves out to online resources generally, but a lot of the research comes from beyond the UK. It was perhaps a little surprising that ELESIG did not have more focus on OER specifically or content more generally.

- We were already aware that 'national policy aspects of OER' was a topic not well covered by e-learning researchers and this was confirmed by our work for this project – very few papers in this area came into view. It does relate to learner use because increasingly governments in the UK and beyond are trying to 'empower' students to demand higher quality from the educational providers and are listening more closely to student views, often via national surveys. We agree that the UK climate is slowly changing and that the link to openness in research is certainly beneficial.

- It was also interesting that a systematic check of both the leading researchers' CVs in TELEurope (the STELLAR Network of Excellence) and their associated literature database revealed almost no interest in OER or papers published on it. Indeed, there is an issue both in the UK and the EU of a disconnect between the OER community and the 'elite' (perceived or self-styled[84]) of e-learning research – with the exception of The Open University in particular and some key individuals there and at a few other locations. It may be just an artefact of our perspective on them but this seems a little less the case in the Netherlands and Canada (though in some other English-speaking countries the communities seem as disconnected as the UK).

- It is only just emerging as an issue, but we feel that learner-*generated* content – which did not fit into our brief – is also under-researched in a *systematic* way (despite a couple of EU projects and the activities of, for example, MELSIG). Some OER Phase 1 projects did touch on aspects of this.

- Finally, with the exception of most open universities and a few elite universities (though steadily growing in number) there seem to be few UK or EU universities with *university-wide* policies and strategies on OER. It is surely a lesson both of JISC and HEA work over many years that an issue that does not generate a strategy and people to implement it (IT, e-learning, retention, internationalisation, etc.) is an issue that tends not to get resolved.

[84] Judged in relation to such metrics as REF, FP7/LLP grant holders, ESRC TEL grant holders and committee members, ALT-C research committee, e-learning journal editors, etc.

6.1 For additional research work in the area

Such general findings are all very well but in these straitened days it is unlikely that all such can be resolved within a UK context. So here we concentrate on the most pressing problems and ones most directly relevant to the current study. We make no apologies for our scope being primarily HE focused given the current 'minimal' state in the UK of agencies and funding for e-learning in schools and FE – in England at least.

Learner use projects

A number of learner-focused evaluation projects need to be funded, to look at learner use/views of OER in at least the following areas:

- student use of Wikipedia (including search and quality judgement also) – and we recommend that this is done in explicit liaison with the Wikimedia Foundation Public Outreach Department[85];
- student use of academic-generated podcasts (audio);
- student use of videos;
- student use of OER and online resources created by other students;
- student study-time issues for students accessing OER and online resources;

Ideally these projects should be as broad and large-scale as possible and involve several institutions from the various parts of the HE sector. They should not involve *creation* of any new material but it would be wise if they evaluated material already created (e.g. under the JISC/HEA OER Phase 1 and Phase 2 programmes) whether by their institution or others. It may be appropriate if some of the funding is channelled via MELSIG and ELESIG. It is perhaps a little premature to advise on methodologies, but for some projects it seems necessary for detailed learning diaries to be kept by students and for resource use to be tracked by the online systems used to support their learning.

Extending the language coverage of the LUOERL database

It seems to be increasingly the case that simplistic educational comparisons cannot be made between countries, even at the university level, as the funding regimes for countries evolve and diverge. Thus it would be wise to check the own-language literature at least from the Netherlands and Sweden even though the number of hits is not likely to be large. In the Netherlands this might involve SURF as JISC's natural partner, but it should be noted that the Dutch Open University is central to the activity there[86]. There is a more substantial literature in Spanish and to a lesser extent in French (as earlier noted); and even though there might be less immediate applicability it could be

[85] http://www.slideshare.net/Peteforsyth/public-outreach-at-wikimedia

[86] The work might not be very onerous since Google scholar records only two direct hits for the Dutch phrase 'open leermiddelen' for OER in the titles of articles, with a further 12 mentions in the body of the text – http://scholar.google.co.uk/scholar?as_q=&num=100&btnG=Search+Scholar&as_epq=open+leermiddelen&as_oq=&as_eq=&as_occt=title&as_sauthors=&as_publication=&as_ylo=&as_yhi=&as_sdt=1.&as_sdtf=&as_sdts=5&hl=en – and the numbers are similar for 'Öppna lärresurser' in Swedish.

argued that the exercise would be useful. To go beyond that to other languages enters the domain of an EU-funded activity rather than a nationally funded project.

An 'Open Educational Bibliography' of OER

In order to establish the area of OER as a REFable[87] activity worthy of the attention of the best scholars in e-learning, a comprehensive open, editable and repurposable bibliography of papers and other literature on OER should be generated – an *Open Educational Bibliography*. Appropriate UK research councils especially ESRC should be involved.

It raises an additional level of complexity if international partners are involved (and currently in the US and Australia, funds for such activities seem minimal) so the initial bibliography should be of material available in English with a focus on UK needs. However, if funds permit an International Steering Group could be set up to guide this, with collaboration from at least Canadian, Dutch, Swedish, Australasian and US experts as well as UK researchers.

We further recommend that Mendeley is used for this since building the community and generating community consensus is vital.

Guide to good practice

A study team should be assembled from a number of institutions and involving external examiners to produce a practical guide aimed at students, staff and external examiners to cover the issues raised by study – and citation – of OER materials including but not only Wikipedia and its associated corpora. This should draw on work on quality of OER from projects such as OPAL but have a very practical focus and in particular assist students and staff to judge realistically the quality of OER. The aim should be to build consensus across the sector. This seems a particularly appropriate project for the Higher Education Academy to lead on.

6.2 For policy and practice

The following recommendations are made:

- Institutions should pay more attention to student views and experience of OER and online resources. (Quality and benchmarking schemes and associated survey instruments can easily be updated to accommodate a greater focus on content[88].)
- Institutions should consider together with their external examiners how best to foster judicious use of resources (including OER) by students, especially in their project and dissertation work.
- In course redesign, institutions should aim to make more use of OER and externally provided free-of-charge, non-open resources (e.g. via JISC repositories) in future programmes.

[87] This strange phrase is explained at http://chronicle.com/forums/index.php?topic=46432.310;wap2.

[88] In addition to EU work especially from OPAL, Pick&Mix has an OER mode, which has been under consideration by the Dutch Open University.

- Institutions should ensure that when providing public information about their courses descriptions of 'study time' and 'contact hours' for courses do not get trapped into a classroom-based narrative that does not provide a realistic description of the learner experience in relation to OER and online systems[89].

6.3 Management of references – Mendeley

This project was not about the Mendeley research management tool but we were asked to use it and agreed to that and it raised many issues, both technical and methodological.

We feel it is incumbent on us to make some recommendations. We stress that after what felt like a baptism of fire we remain committed to Mendeley and are using it for other projects. However, as research management tool, it has to evolve and fast; otherwise it will not become the *de facto* standard its developers hope for.

6.3.1 Observations

This project cannot be regarded as a systematic trial of Mendeley. The observations that follow have not been *systematically* researched, since that was not the focus of our project.

Given that JISC is interested in Mendeley and has funded a technical project involving it, we feel that a 'proper trial' would be useful. The following information may help. (An early version of our views was discussed with a Mendeley contact who was very informative, and the Mendeley section of our interim report at the end of May was sent to Mendeley.)

The Mendeley community and its interpenetration with the e-learning community

1. The community-building aspects of Mendeley, as with other systems, cannot be judged in a two-month project. We are building followers slowly for the project but it would take a year or two to establish a viable community in an e-learning area. (This is confirmed by some pilot work by us in other areas – e.g. *Benchmarking e-Learning* or *Quality of e-Learning*.)

2. There are not many e-learning experts on Mendeley and very few who appear to be active or skilled users. Indeed, we emailed about two dozen of our main research contacts (in UK and beyond) who were on Mendeley: most who replied stated that they were not active users and some had some interesting if negative comments about Mendeley's community aspects. This of itself does not mean that Mendeley is a bad system or that other research communities (e.g. biomedical) are also not using it (rather the reverse in the latter case).

3. If one judges competence by the operational threshold (rather minimal, some might say) of having produced a CV page with most of one's research papers on it, then many of the Mendeley Advisors in the UK do not pass that threshold[90].

[89] This may become particularly relevant if the recommendations in the Higher Education White Paper for England *Students at the Heart of the System* come to pass – http://discuss.bis.gov.uk/hereform/white-paper/.
[90] http://www.mendeley.com/advisors/

4. Searches (of the Google type 'Mendeley site:ac.uk'), including at the universities we work with, indicate that few UK universities seem to have any institutional focus on Mendeley support from central departments such as Learning or Research Services. (The University of Leicester and possibly The Open University seem exceptions.)

5. Mendeley does not seem to plan any events in or for the UK in the next four months (unlike in the Americas[91]).

Mendeley documentation

- The Mendeley user guide is very limited and contains no recommendations as to best practice, workarounds or most efficient use. Indeed, it addresses only the most basic functions of the system, leaving hundreds of features undocumented. We are developing our own guidelines but there was not enough justifiable effort to document them by the end of this project.

Mendeley the system

1. The historical core of Mendeley is the adding of PDFs to Mendeley groups, in order to create a shared collection of references. Mendeley tries to 'recognise' (i.e. identify metadata from) relevant bibliographic information but usually does not do a good job – one may get a PDF in the repository, but have no way to identify it. (There are also strong restrictions on sharing PDFs in groups which are publicly visible.) The process of PDF drag-and-drop can be tedious; as can manually editing several fields of every new entry, which is often required.

2. Despite the description of 'PDF import', Mendeley cannot 'recognise' and import the typical reference list at the end of a research paper in PDF format; or, for that matter, a bibliography in any format. Of course, neither can EndNote. This is a big problem for most systems.

3. Mendeley has extremely limited ability to recognise duplicate entries.

4. For certain bibliographic databases and certain blogs and wiki systems (e.g. Wikipedia) Mendeley does a reasonable job of recognising the key bibliographic fields. However, it is not as good as EndNote in its coverage of systems and not as 'deep' or integrated with the underlying systems as EndNote is.

5. The two-client mode of Mendeley (desktop client and web interface) can cause usability issues as noted by experts such as Erik Duval (who is a competent user as evidenced at http://www.mendeley.com/profiles/erik-duval/).

6. Even a simple routine task such as 'read email, note a reference, add to Mendeley' or 'download and add a PDF' leads to a surprisingly large number of windows on the screen and a demand for screen acreage – with 24-inch or dual monitors suggested (as used by Sara).

[91] http://www.mendeley.com/events/

7. EndNote export to Mendeley has bugs (e.g. persistent trading of first name and surname).

8. Many researchers want to do more sophisticated processing of bibliographic references than Mendeley allows (e.g. it has no compound search facility). This is normally done in MS Excel. One can install an 'Excel' citation style but it seems impossible to export reliably into Excel. Generally speaking Mendeley lacks the ability to 'report' like most database-based programmes – thus its bibliometric analysis is simplistic

9. The 'official' Mendeley way for creation of bibliographies through an MS Word plug-in has bugs, and has been found to slow down Word considerably. At present we create bibliographies by 'copy' from a Mendeley group and then direct 'paste' into Word – it works remarkably well, but has persistent issues with consistency in names (e.g. conversion of *De Silva, John* into *Silva, JD*).

10. There is a bug in the Mendeley desktop client which means that one cannot search on single-digit numeric tags – which we used initially to rank (for relevance to our literature review) the entries in each group. This meant that we had to recode each entry for over 200 entries.

11. Perhaps due to its origins in the media industry and then its rapid development into system to support libraries, Mendeley does not have an adequate set of document types to support 'grey literature' entries. There are workarounds (e.g. we use *Magazine Article* for a blog posting and *Conference Proceedings* for a conference presentation) but these are not standard (e.g. many might use *Website* or *Newspaper Article* for a blog posting) – and one must often switch between a combination of types to input a full set of bibliographic data.

12. This is not an exhaustive list. There are many other irritations.

6.3.2 Recommendations on Mendeley

Our main recommendation is that there should be a 'proper trial' of Mendeley over a longer period (at least one year) so that there is time to see whether it can support a larger and more collaborative project than this one, and so that its community features can be systematically evaluated. This trial should be done with the full knowledge of Mendeley and an enhanced level of support.

Given earlier observations, we further recommend that the natural topic for the collaborative project is to construct a comprehensive structured and tagged database of literature references in English in the area of OER. (Earlier estimates suggest that there might be up to 4,000 'scholarly' references[92] and up to 2,000 relevant ones in the grey literature.)

[92] A narrower search on *journals* on EBSCOhost specifically for 'open educational resources' produced 600 hits – as against 4,300 for 'Learning Management System'.

7. References

Copies of the two relevant online Mendeley databases were inserted into this section on the morning of 29 June 2011. The lists below have then been edited in line with comments from the HEA editor, other mistakes we have found, and changes in URLs (many more final reports are now available and other URLs have changed or gone out of service). Some corrections have been flowed back into Mendeley (mainly the changes in author names and lead authors) but a full update of the Mendeley online database – especially to include the updated URLs – is still to be done.

Earlier infelicities due to conversion issues from Mendeley (there have been some issues with surnames of two words) have been corrected. There could still be occasional mistakes in the Mendeley groups, which can occur due to Mendeley's limited recognition of page numbers within journals. Manual checking and recoding of all bibliographic entries (over 290) was just not feasible in the time[93] and contrary to the spirit of Mendeley where leveraging on its existing corpora is one of its key features.

7.1 Bibliography on learner use of OER

This includes each and every project report from the JISC/HEA OER Pilot Programme, and associated JISC/HEA OER projects and analyses. Where known, URLs for all final reports are now included.

Currently there are 138 items, of which around 56 are from the JISC/HEA OER reports.

The bibliography is in the Harvard author-date format in the font and type size as output automatically by Mendeley. It has then been manually amended to take account of last-minute changes and updates but no new entries have been added. Some adjustments to the order of items output by Mendeley have also been made to conform to best practice.

Note: Researchers wishing to take this work forward should not use this bibliography but should work directly with the version on Mendeley – http://www.mendeley.com/groups/1074991/learner-use-of-oer/papers/ – or with an authorised copy of that (details depend on decisions to be taken after the end of the project).

All entries were checked for web access in the period May-June 2011 and rechecked/updated in early September 2011 but URLs can never be guaranteed.

Some entries lead to URLs for which there is no public access. This seems particularly inappropriate for a bibliography on OER. On the whole we provide such URLs only when it is likely that staff and students at many universities will have access, due to their licensing agreements. Note that with the passage of time, more articles will become openly available.

[93] We have, however, systematically deleted Mendeley artefacts beginning 'ST –' in entries that typically occur after page numbers in journal entries.

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7.2 Bibliography on learner use of non-OER online resources

Currently there are 153 items.

The bibliography is in the Harvard author-date format in the font and type size as output automatically by Mendeley. It has then been manually amended to take account of last-minute changes and updates but no new entries have been added. Some adjustments to the order of items output by Mendeley have also been made to conform to best practice.

Note: Researchers wishing to take this work forward should not use this bibliography but should work directly with the version on Mendeley – http://www.mendeley.com/groups/1098021/learner-use-of-non-oer-online-resources/papers/ – or with an authorised copy of that (details depend on decisions to be taken after the end of the project).

All entries were checked for web access in the period May-June 2011 and rechecked/updated in early September 2011 but URLs can never be guaranteed.

Some entries lead to URLs for which there is no public access. This seems particularly inappropriate for a bibliography about OER. On the whole we provide such URLs only when it is likely that staff and students at many universities will have access, due to their licensing agreements. Note that with the passage of time, more articles will become openly available.

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Appendix 1: Blogs and Wikis

A1.1 JISC/HEA OER Programme blogs and wikis

https://csapoer.pbworks.com/w/page/25711397/Project-report

http://www.ntushare.org/

http://blogs.cetis.ac.uk/cetisli/

http://icesculpture.wordpress.com/

http://blogs.cetis.ac.uk/johnr/

http://olnet.org/blog/

http://blogs.cetis.ac.uk/philb/

http://blogs.cetis.ac.uk/philb/2011/02/17/some-downside-to-oer/

http://csapopencascade.wordpress.com/

http://blogs.oucs.ox.ac.uk/openspires/

http://ostrichatderby.wordpress.com/

http://csapopencollections.wordpress.com/

http://openfieldwork.org.uk/

http://oerworld.wordpress.com/

http://www.web2rights.com/OERIPRSupport/blog/

http://blogs.cetis.ac.uk/lmc/

http://dkernohan.posterous.com/rss.xml?tag=oer

http://blogs.nottingham.ac.uk/learningtechnology/tag/oer/

http://www.medev.ac.uk/blog/oer-phase-2-blog/

A1.2 Other UK and international OER-relevant blogs and wikis

http://www.pontydysgu.org/2011/05/moocs-a-model-for-open-education/

http://www.pearltrees.com/#/N-f=1_354808&N-fa=355111&N-p=2134294&N-play=0&N-s=1_354808&N-u=1_27337

http://orioleproject.blogspot.com/

http://change.mooc.ca/

http://www.oercommons.org/community/oer_type/blogs-and-wikis

http://opencontent.org/blog/

http://oerblogs.org/

http://www.marcprensky.com/blog/

http://oerwiki.iiep.unesco.org/index.php/OER_useful_resources/Writing_on_OER

http://learningspaces.org/n/

A1.3 Miscellaneous presentations etc.

These are a few presentations that we found particularly useful in the early stages of the project. Later on we focused mostly on papers.

A considerable amount of additional material outside the scope of 'learner use' can be found at: http://www.mendeley.com/groups/1102391/learner-use-of-online-and-oer-for-learning-luoerl-the-community/.

On the specific topic of learner-generated content see our pilot work at: http://www.mendeley.com/groups/1216571/learner-generated-content/.

Open for Use? The Challenge of User Generated Content and its Impact on Open Educational Resources. Steve Wheeler, University of Plymouth, at: http://www.slideshare.net/eden_online/open-for-use-the-challenge-of-user-generated-content-and-its-impact-on-open-educational-resources?from=ss_embed

RIDE 2010 Keynote: Open Educational Resources and Learning Spaces: research questions. Josie Taylor, OU, at: http://www.slideshare.net/CdeLondon/ride-talk-josie-taylors-version.

Elluminate – OERs across sectors at: https://sas.elluminate.com/mr.jnlp?suid=M.D870399351F325D368914475DE0097&sid=2009077.

Appendix 2: JISC/HEA OER Programme Phase 1 Projects

These are the projects from the *JISC and Higher Education Academy Open Educational Resources Programme – Phase 1.*

Anglia Ruskin University *NumBat (Numeracy Bank)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Anglia_Ruskin_final_report.pdf

University of Birmingham *C-SAP OER (Centre for Sociology, Anthropology and Politics)*
Site:
http://www.heacademy.ac.uk/ourwork/teachingandlearning/alldisplay?type=projects&newid=oer/OER_SUB_CSAP&site=york
Evaluation report at http://www.c-sap.bham.ac.uk/oer/reference/evaluation.html

University of Bradford *brOME OERP (Open and Mobile Education)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Bradford_final_rep.docx

University of Brighton *OER ADM (Art Design Media)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/ADM-OERProjectFinalReport.docx

University of Bristol *TRUE (Teaching Resources for Undergraduate Economics)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Economics_final_rep.doc

University of Central Lancashire *EVOLUTION (Educational and Vocational Objects for Learning Using Technology In Open Networks)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/UCLAN_final_rep.doc

Coventry University *OCEP (Open Content Employability Project)*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/ocepfinalcomplete_web.pdf

University of Exeter *Open Exeter*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/oer-final-report-exeter.doc

University College Falmouth *Open Space Project*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_final_report_openSpaceFinalMay2010v2FALMOUTH.doc

University of Hull *Skills for Scientists*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Skills_for_scientists_final_report_completed.pdf

University of Leeds *UK Centre for Bioscience OER Project*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Bioscience_final_rep.docx

Leeds Metropolitan University *Unicycle*
Final Report:
https://www.box.net/shared/kk4jisht5e (For the project see
http://www.jisc.ac.uk/whatwedo/programmes/elearning/oer/unicycle.aspx)

University of Leicester *OTTER (Open, Transferable and Technology-enabled Educational Resources Project)*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/otterfinalreport27april2010_v2%201.pdf

University of Lincoln *ChemistryFM*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Lincoln_Final_Report.pdf

University College London *Open Learning Environment for Early Modern Low Countries History*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_UCL_final_report.pdf

Loughborough University *Open Engineering Resources Pilot*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Engineering_final_rep.doc

University of Liverpool *CORE Materials (Collaborative Open Resource Environment – for Materials)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/Materials2_final_rep.doc

Newcastle University *MEDEV OOER (Medicine, Dentistry and Veterinary Medicine Organising Open Educational Resources)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/MEDEV_OOER_final_report_v1.pdf

Newcastle University *Health Sciences and Practice Subject Centre PHORUS (Public Health Resources in the University Sector)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_HSAP_final_report.pdf

University of Nottingham *BERLiN (Building Exchanges for Research and Learning in Nottingham)*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/berlin_final_report_v1.0.pdf

Nottingham Trent University *FETLAR (Maths, Stats and OER Subject Centre Finding Electronic Teaching Learning and Assessment Resources)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/FETLAR_final_report_1.2.doc

University of Oxford *Open Spires Project*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/openspires_final_report_v4_22_april_2010.doc

University of Plymouth *C-Change in GEES (Geography Earth and Environmental Sciences Subject Centre Climate-Change)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/GEES_final_rep.docx

University of Southampton *The HumBox Project*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/LLAS_final_rep.pdf

Staffordshire University *OpenStaffs Project*
Final Report:
http://www.jisc.ac.uk/media/documents/programmes/oer/openstaffs_final_april.doc

University of Ulster *ICS Project (Information and Computer Sciences Subject Centre, Open Educational Repository in Support of Computer Science)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/ICS_final_rep.doc

Warwick University *The Simshare Project (UK Centre for Legal Education Simulation OER)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_UCKLE_final_report.pdf

University of Westminster *Multimedia Training Videos*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_Westminster_final_report.pdf

University of York *JBB Project (Java Bread-Board Tools for Electronic Learning)*
Final Report:
http://www.heacademy.ac.uk/assets/York/documents/ourwork/oer/OER_1_York_final_report.pdf

Overview and links to all projects at:
http://www.jisc.ac.uk/whatwedo/programmes/elearning/oer.aspx

Appendix 3: Interim report (May 2011)

A3.1 Overall progress

The period from start (late April) until end of May 2011 was one in which there were an unusually high number of public holidays this year so that we did not expect to reach exactly halfway in project outputs. In addition each of the three core team members had to cope with non-work situations both welcome and unwelcome. Nevertheless good progress has been made and two interim bibliographies are now available.

The project is very fast-moving and a strong focus has so far been given to achieving *results* rather than producing documents – apart from this report including the bibliographies. In particular there have been a number of iterations of the research plan in the light of project priorities, technical challenges and feedback requested from our critical friend, but it was decided to be a waste of scarce effort to keep regularly updating the full research plan.

A dissemination wiki was set up (http://luoerl.referata.com/wiki/Main_Page) at project start and there is a project page on the Sero website (http://www.sero.co.uk/showcase-luoerl.html) linked to the Sero main page.

The supporting technology being used is Mendeley, though in for the first half of May only one person (Paul) used it as the primary literature indexing tool. The work plan did not survive first contact with the real world of hard-to-find relevant resources, non-work challenges and the current limited functionality/reliability/usability of Mendeley – it soon settled down to the following:

- Literature search for relevant articles in journals etc. across bibliographic databases – both UK and non-UK literature – Sara using EndNote to collect and then export to Mendeley at intervals – though from later May she used Mendeley direct. She accessed mainly EBSCOhost but also Summon (a Google-like 'unified discovery service' across.edu library resources). EBSCOhost searches across multiple databases simultaneously, including ERIC, the world's largest digital library of education literature, and Education Research Complete, which provides indexing and abstracts for more than 2,100 journals (as well as full text for more than 1,200 journals).

- Review of 'grey' literature including OER-relevant blogs, and detailed reading of all OER Phase 1 reports and analyses, to tease out in detail what was revealed about student attitudes and behaviour – Barry using ad hoc indexing tools. In more detail he looked at 30 institutional project final reports, over-arching programme reports, JISCInfonet, various bloggers associated with JISC/HEA OER Programme plus other key blogs and wikis (Downes etc), Elluminate OER presentations, other UK-based OER projects (notably OU OpenLearn), and the JIME OER special issue.

- 'Horizon scan' aspects including building the project community on Mendeley and links to ELESIG, EU projects (including the STELLAR network), Twitter streams, listservs and international OER activities (UNESCO, ICDE, OPAL, OER Foundation etc.) – Paul using direct collection into Mendeley.

A3.2 Quants and outputs

1. Interim Bibliography on *Learner Use of OER* (59 items) – this is the bibliography generated from the Mendeley Group of the same name – see Appendix 1.

2. Interim Bibliography on *Learner Use of non-OER Online Resources* (116 items) – this is the bibliography generated from the Mendeley Group of the same name – see Appendix 2.

3. A community group on Mendeley *LUOERL for the community* – this is a group oriented to discussion and populated by documents it was hoped might generate discussion; it has 51 documents, many of which when relevant have from time to time been copied in to the two main project Mendeley groups (1 and 2 above). Despite strenuous efforts, community building is a slow process.

4. Two other Mendeley groups set up to ensure that no potentially relevant resource especially an OER-relevant resource was thrown away – the motto being 'capture first, analyse later'. These groups correspond to the key non-learner stakeholders in OER – academic/institution and national ministry/agency. The groups are *OER – non-policy aspects – teacher and institution* (87 documents – the most densely populated group, not surprising given the strong HEA/JISC and EU focus on this area) and *National Policies for OER Uptake* (only 28 documents – a small number confirmed by other searches in other projects).

5. A list of relevant blogs and wikis – see Appendix 3.

A3.3 Summary of research findings so far

There is a caveat in that the focus so far, except for Barry, has been on collection and not on deep analysis. The notes that follow are more detailed and evidence-based than our framing hypotheses in the bid, but far from final conclusions.

They mainly come from Barry's work so are very focused on UK and on the OU and OER Phase 1 projects and the existing summaries of these, but judged in the light of earlier Sero work on digital literacy in relation to student searching for and use of resources. There is nothing that Paul or Sara would disagree with.

- There is, even within the existing 'traditional' (i.e. young) HE student constituency, a vast spectrum of learners' digital confidence/competence – the earlier assumptions about digital natives and immigrants are being increasingly seen as simplistic.

- The use of OER would challenge this range even as it stands. However, the potential of OERs to broaden the catchment and attract new learners (of all ages) is likely to aggravate the tensions.

- There is a need for a pedagogic 'wrap around' (i.e. pedagogic information providing context for OERs).

- On the other hand, many independent learners want to dip in, just to resources that are of *immediate* relevance to them, rather than to follow a set path through a unit of study.

- When using online resources to broaden the catchment it is increasingly desirable to use terms that are familiar to the general public and to be consistent in terminology – e.g. do not interchange terms like 'session' and 'unit'.

- Some projects have found students very ready to contribute materials ... but others (e.g. OTTER) report a third of students as saying they would not be willing to turn materials such as lecture notes into OERs and share them with other students. However, students also report sharing knowledge *of* and *about* resources.

- Staff in some projects believe that it is the *activities* that are associated with the use of the OERs (not the OERs as such) which 'carry the learning forward'.

- Students and staff tend to prefer simple, single-box search strategies but students seem to use a wider range of sources (e.g. Wikipedia). (Confirmed by Sero work prior to this study.)

- Some projects feel that students will be more likely to use resources if they are placed in areas where students would typically already look for them and may indeed 'stumble across' them.

- "... the use of open content promotes a set of skills that are critical in maintaining currency in any area of study – the ability to find, evaluate, and put new information to use" ... unlike many textbooks. (We need more evidence from students that they believe in and value this.)

- A key question remains – if designing for the learner is key, then how do we overcome the uncertainty of not knowing who the learner may be?

- There are a number of observations which seem more project-specific:

    - The vast majority of the OpenLearn student users were 35-54 yrs and evidently self-motivated learners. Thus it could be unwise to extrapolate too much from conclusions about OpenLearn. Most OpenLearn students are primarily interested in the content more than the opportunity to network with other students. The value of the content to these students is that it is designed for self-study.

    - In the OTTER project, the preferred options for access to OERs were the institutional VLE and the OER repositories. (This needs checking with more projects.)

    - In the Open Spires project, audio downloads (podcasts) were more desired than video of the same items. Since transcription is expensive this has implications for accessibility. (This has been discussed in MELSIG and in other fora.)

A3.4 Terminology issues and search terms

There is a particular lack of clarity with regard to terminology on the various stakeholders, especially in the JISC/HEA OER projects. *Users* can mean staff or students. It can mean staff who produce then use, or staff who just simply use. *Producers*, *depositors*, and *creators* also mean staff from whom the materials originate. *Learners*, *students* and *users* can also be interchangeable.

Some successful keyword search terms of note (when used in combination) include: OER; OERs; open educational resources; open educational; open content; education; digital textbooks; open/free digital textbooks; information-seeking behavio(u)r; information seeking; information behavio(u)r; information; research; online; online research; internet; internet research; e-books; students; learners; users; use; Wikipedia; google; digital; digital library; digital/information literacy; impact of OER; scaffolding; digital natives/immigrants; millennials.

A3.5 Wider research issues

Several (many) of the JISC/HEA OER projects have a stated intention to evaluate/assess/analyse learner experiences and attitudes but the vast majority (understandably) have this as a next step. The relative immaturity of the projects is usually given as the reason. We also have to cope with the fact that this study closes before most of the OER Phase 2 reports are produced.

We were already aware that national policy aspects of OER was a topic not well covered by e-learning researchers and indeed this was a key reason for the EU bid that Sero submitted along with some other EU partners. It was also interesting that a systematic check of both the leading researchers' CVs in TELEurope (the STELLAR Network of Excellence) and the associated literature database revealed almost no interest in OER or papers on it.

However, it was more surprising that there seemed relatively little interest in learner use of *content*. The list of 116 hits is a small selection of a much wider set of papers on learner use of systems and of learner-learner links (merging into social networking).

More interestingly and more locally, the same is true nowadays of ELESIG. However, there we did find a few resources including one very useful bibliography (http://www.heacademy.ac.uk/assets/EvidenceNet/International_students_experience.pdf).

There are two groups on Mendeley that were not set up by our team that refer to OER:

1. *OER OpenEd business models* – set up we suspect for an EU project, but this contains no documents and has only one member and a handful of followers.

2. *Open Educational Resources* – this group, set up in early April by someone not associated even distantly with this project, has 15 members and four human followers. Seemingly it has 83 resources but the vast majority of these were added by Sara or Paul during the phase of practising with Mendeley and are duplicated in the groups we control. The group has had no contributions since 9 May – possibly because our work has taken the initiative, possibly for other reasons.

Apart from these we could find no relevant bibliography already on Mendeley – though we did check CVs of a number of experts and added their OER-relevant publications to our groups.

Beyond that, there are not many e-learning experts on Mendeley and very few who appear to be active or skilled users. Indeed, Paul emailed about two dozen of his main research contacts (in UK and beyond) who were on Mendeley: most who replied stated that they were not active users. This of itself does not mean that Mendeley is a bad system or that other research communities (e.g. biomedical) are also not using it – rather the reverse in the latter case.

A3.6 Mendeley

Which brings us to Mendeley. This project was not about Mendeley but we were asked to use it and agreed to that. Thus 12 brief interim observations are in order. (There are more e.g. on its actual cost in realistic project situations.) None have been systematically researched as that is not the focus of this project.

1. This project cannot be regarded as a systematic trial of Mendeley. Given that JISC is interested in Mendeley and has funded a technical project involving it, we feel that a 'proper trial' would be useful.

2. The community-building aspects of Mendeley, as with other systems, cannot be judged in a two-month project. We are building followers slowly for LUOERL but it would take a year or two to establish a viable community in an e-learning area. (This is confirmed by some pilot work by Paul in other areas – e.g. *Benchmarking e-Learning* or *Quality of e-Learning*.)

3. The historical core of Mendeley is the adding of PDFs to Mendeley groups. Mendeley tries to recognise bibliographic information but usually does not do a good job – but at least one gets the PDF in the repository. (However, there are strong restrictions on sharing PDFs in groups which are publicly visible.) The process of PDF drag and drop is tedious.

4. Despite the description of PDF import, Mendeley cannot recognise and import the typical bibliography at the end of a research paper in PDF format. Of course, neither can EndNote. This is a big problem – one is reduced to manual methods.

5. For certain bibliographic databases and certain blogs and wiki systems (e.g. Wikipedia) Mendeley does a reasonable job of recognising the key bibliographic fields. However, it is not as good as EndNote in its coverage of systems and not as 'deep' or integrated with the underlying systems as EndNote is.

6. EndNote export to Mendeley has bugs.

7. Mendeley creation of bibliographies also has bugs (as Sara recently discovered) and needs workarounds. At present these still prevent italics and bold in bibliographies.

8. The two-client mode of Mendeley (desktop client and web interface) can cause usability issues as noted by experts such as Erik Duval (who is a competent user as evidenced at http://www.mendeley.com/profiles/erik-duval/).

9. Even a simple routine task such as 'read email, note a reference, add to Mendeley' leads to a surprisingly large number of windows on the screen and a demand for screen acreage – with 24-inch or dual monitors suggested (as used by Sara).

10. The Mendeley user guide is very limited and contains no recommendations as to best practice, workarounds or most efficient use. We are developing our own guidelines but there will not be effort within the LUOERL project to document them.

11. Many so-called Mendeley Advisors (http://www.mendeley.com/advisors/) seem not to exhibit public evidence of their expertise as judged by their CVs (e.g. lists of publications) and contributions to groups.

12. Searches (of the Google type 'Mendeley site:ac.uk'), including at the universities we work with, indicate that few UK universities seem to have any institutional focus on Mendeley support from central departments such as Learning or Research Services. The University of Leicester and possibly the OU seem exceptions.

A3.7 Next steps

The focus for Barry first moves to importing his relevant references (blog entries, project reports etc.) to Mendeley and then to work with Paul and to some extent Sara on reading key documents from the bibliography. He will continue to monitor blog entries right up to the end of the project.

The focus for Paul and Sara turns to doing a first cut of papers by checking the abstracts in detail and then a second cut to identify the full-text needs to be processed.

A five-level tagging system is being developed ranging from 1 (collected but not at all relevant) to 5 (collected, abstract relevant, full text relevant and needs summarising for final report). Other non-numeric tags will be used for relevant country, educational level etc. This process has already started but only just.

We do not now expect to uncover many more relevant references in the published literature but there will be more hidden in the grey literature – and there is still a month of blogging to come.

Appendix 4: Less relevant papers

These papers have had their abstracts reviewed but have not been read. There is likely to be useful contextual information in these papers but by the very fact of their lower classification we do not believe that any of them would substantially change the picture.

A4.1 Less relevant OER papers

A4.1.1 'Related' resources

These are tagged 'L2' in the online bibliography.

Among the 17 'related' non-'JISC/HEA OER' resources we find further explorations of iTunes U and Wikipedia as learning tools. Repeated calls for future research into the area of OER learner use are set forth, and the voices of library scientists begin to emerge as relevant (OER is not typically their area).

1. 'Cohere: A prototype for contested collective intelligence' (De Liddo & Buckingham Shum 2010) describes a social, semantic annotation tool being tested in the OER environment (as mentioned in the conclusion); relevant in clarifying Shum/DeLiddo's other key OER work. [UK]

2. *Numbers Matter: Let's Provide Open Access to Usage Data and Not Just Research Papers* (Kelly 2011) discusses the need for tracking educational social media usage data, highlighting OU/iTunes U as examples. Explores some of the limited data available. [UK]

3. 'The impact of openness on bridging educational digital divides' (Lane 2009) provides a survey of colleagues' work in the field – and a helpful bibliography. [UK]

4. "New Spaces, New Tools, New Roles: Two Case Studies on the Impact of Open Educational Resources" (Ferreira 2009) engages with two very small pilot learning projects, looking at use of OER contextualised in a broader communications context (though in less detail than the title would suggest). [UK]

5. *Good intentions: improving the evidence base in support of sharing learning materials* (McGill *et al*. 2008) is a synthesis of other related reports, with an excellent bibliography. [UK]

6. *Open Educational Resources – Opportunities and Challenges for Higher Education* (Yuan *et al*. 2008) explores social, cultural and pedagogical concerns, calling for more information on learner use of OER. Some MIT OCW statistics are discussed. [UK]

7. 'New Ways of Mediating Learning: Investigating the implications of adopting open educational resources for tertiary education at an institution in the United Kingdom as compared to one in South Africa' (Wilson 2008) looks at some factors that impact students using OER in tertiary education. [UK/South Africa]

8. *Background Note 1: Mapping users and producers of Open Educational Resources* (Hylén 2006a) explores OECD surveys from Spring 2006 (targeting institutions, individual teachers

and researchers). Data profiling the OER end user base (which includes students) is provided. [International]

9. 'OpenER, a Dutch initiative in Open Educational Resources' (Schuwer & Mulder 2009) briefly explores student use of OER. [Netherlands]

10. 'Building Open Educational Resources from the Ground up: South Africa's Free High School Science Texts' (Petrides & Jimes 2008) is an ISKME case study based on surveys/interviews with participants in classroom trials (at eight Durban-area South African schools). Results exist but are not specifically discussed. [South Africa]

11. 'Surgery podcasts go viral' (Siebarth 2011) looks at the case of an independent doctor whose Surgery 101 podcasts now average about 1,000 downloads a day, or roughly one every two minutes. [Canada]

12. 'iPod University' (Brownell 2011) explores learner use of iTunes U and YouTube. [US]

13. 'Sleeping with the Enemy: Wikipedia in the College Classroom' (Chandler & Gregory 2010) details a course in which students were taught to use Wikipedia, studying their reactions and outputs. [US]

14. 'The networked student model for construction of personal learning environments: Balancing teacher control and student autonomy' (Drexler 2010) examines K-12 use of OER, in the context of iTunes U only; 15 students participated during a nine-week term as part of a contemporary issues research project. [US]

15. 'Why Engineering Students Love Wikipedia' (Field 2006) is light in tone, but (briefly) reviews discussions with engineering students at MIT about their use of Wikipedia to search for technical information. [US]

16. 'Understanding the Use of Digital Collections in Undergraduate Humanities and Social Science Education' (Harley *et al*. 2005) addresses use of free/'unrestricted' digital libraries, offering a preliminary analysis of surveys and discussion groups with various faculty and postgraduate student populations (from UC Berkeley, other UC campuses, liberal arts colleges, and community colleges). [US]

17. 'The Role of the Library in Open Education' (Madsen & Hurst 2005) provides the 'library science' view of learner use, from the Open Collections Program (OCP), Harvard. [US]

A4.1.2 'Somewhat related' resources

These are tagged 'L1' in the online bibliography.

The 11 items appearing on this list – the least relevant of relevant non-'JISC/HEA OER' pieces – are diverse and in some cases only very tangentially relevant to the topic of learner use of OER.

1. *Response from JISC to the Independent Review of Intellectual Property and Growth* (anon 2011) is a response to a Call for Evidence that explores in some detail JISC's OER efforts in UK education. [UK]

2. 'The challenges of OER to Academic Practice' (Browne *et al*. 2010) discusses the potential motivators for academics in providing OER material. [UK]

3. *Open Educational Resources – Conversations in Cyberspace* (D' Antoni & Savage 2009) provides the background papers and reports from an earlier two-year series of UNESCO online discussion forums discussing OER; interesting historically. [International]

4. *Open Educational Resources: Opportunities and Challenges* (Hylén 2006b) provides an early OER overview from OECD, *with useful bibliography*. [International]

5. *OECD study of OER: forum report* (Joyce 2007) is a comprehensive early OER survey and report from the OECD Centre for Educational Research and Innovation (CERI), funded in part by the William and Flora Hewlett Foundation. [International]

6. *Giving Knowledge for Free* (Pedró 2007) builds on previous OECD work on e-learning to review the OER movement's catalysts, key players and implications. [International]

7. 'Social models in open learning object repositories: A simulation approach for sustainable collections' (Sánchez-Alonso *et al*. 2011) provides a highly technical approach to analysing OER user behaviour. [Spain]

8. 'Panel on open library, scholarship and learning at Athabasca University' (Anderson *et al*. 2010) collects assorted talks from an Open Access/OER panel event. [Canada]

9. *A Review of the Open Educational Resources (OER) Movement: Achievements, Challenges, and New Opportunities* (Atkins *et al*. 2007) provides an excellent overview of Hewlett Foundation perspective and impact as of 2007. [US]

10. 'Access to Education with Online Learning and Open Educational Resources: Can they Close the Gap?' (Geith & Vignare 2008) approaches the need and context for online learning and OER, from a human rights perspective. [US]

11. *The NMC Horizon Report: 2011 K-12 Edition* (Johnson *et al*. 2011) is an ongoing research effort established in 2002 that identifies and describes emerging technologies on an annual basis. [US]

A4.2 Less relevant non-OER papers

A4.2.1 'Related' non-OER online resources

These are tagged 'L2' in the online bibliography.

The diverse list of 46 'related' non-OER resources below address concepts ranging from simple decision-making on the web to applying advanced user skills to judge provenance of online materials; from the opinions of e-learners to general perceptions of library resources; from e-literacy to the iPad as a source of e-textbooks.

1. 'The Student Experience of E-learning in Higher Education: a review of the literature' (Sharpe & Benfield 2005) is a literature review that surveys the student experience of e-learning in higher education in order to identify areas worthy of future investigation. [UK]

2. 'Library and information resources and users of digital resources in the humanities' (Warwick *et al*. 2008) aims to concentrate upon the importance of information resources, physical research centres and digital finding aids in scholarly research. [UK]

3. 'The digital native – myth and reality' (Selwyn 2009) explores the concept of millennials born as 'digital natives', to develop and promote a 'realistic' understanding of young people and digital technology. [UK]

4. 'Judging relevance: a problem for e-literacy' (Beeson 2006) considers how information can be judged relevant, and what information literacy means, in the context of the world wide web. [UK]

5. *Researchers' use of academic libraries and their services* (anon 2007) seeks to provides a forward-looking view of how researchers interact with academic libraries in the UK. [UK]

6. 'Effective e-learning for health professionals and students: Barriers and their solutions' (Childs *et al*. 2005) reviews results of a study that identifies the barriers to e-learning for health professionals and students. [UK]

7. 'Perceptions of electronic library resources in further education' (Appleton 2006) focuses on a case study in which staff and students at three FE colleges in the Merseyside area share their experiences of electronic library resources. [UK]

8. 'My students and other animals. Or, a vulture, an orb weaver spider, a giant panda and 900 undergraduate business students' (Borg & Stretton 2009) describes how a library team developed and delivered a new information literacy initiative for the undergraduates. [UK]

9. 'Experiences and Opinions of E-learners: What Works, What are the Challenges, and What Competencies Ensure Successful Online Learning' (Beaudoin *et al*. 2009) reports findings of a survey of online learners from Western (mostly US), Israeli, Mexican, and Japanese cohorts to understand how students engage online learning in relation to interacting with the medium and materials. [International]

10. "Perceptions of Libraries and Information Resources: a Report to the OCLC Membership" (De Rosa *et al*. 2005) summarises findings of an international study on information-seeking habits and preferences. [International]

11. 'What Children Can Teach Us: Developing Digital Libraries for Children with Children' (Druin 2005) describes how an interdisciplinary team of university researchers worked with seven children (ages seven to eleven) to design a new digital library for children. [International]

12. 'Use of Online Information Resources by RMIT University Economics, Finance, and Marketing Students Participating in a Cooperative Education Program' (Costa 2009) examines the use of online information resources by third-year students in a co-operative education programme and explores possible factors that influence how students use these resources. [Australia]

13. 'Quality in blended learning: Exploring the relationships between on-line and face-to-face teaching and learning' (Ginns & Ellis 2007) draws on a large body of research, showing that

the approaches students take to learning, and the subsequent quality of their learning, is closely related to their perceptions of their learning experience. [Australia]

14. 'Getting the mix right again: An updated and theoretical rationale for interaction' (Anderson 2003) examines interaction as a crucial component of the education process. [Canada]

15. 'Children's Searching Behavior on Browsing and Keyword Online Catalogs: The Science Library Catalog Project' (Borgman *et al*. 1995) aims to understand more about children's information-seeking abilities. [US]

16. 'Using Online Tutorials to Reduce Uncertainty in Information Seeking Behavior' (Brumfield 2008) seeks to reduce uncertainty during the search process, via creating online tutorials. [US]

17. 'Online Textbooks Fail to Make the Grade' (Carlson 2005) presents information on the 'lukewarm reception' that students and higher education have given to online textbooks. [US]

18. 'A model of young peoples' decision-making in using the Web'" (Agosto 2002) offers a theoretical model of the general criteria young people use to evaluate websites. [US]

19. *Learner Centered Theory And Practice In Distance Education: Cases From Higher Education* (Duffy & Kirkley 2004) examines critical issues in the design of theoretically and pedagogically based distance education programmes. [US]

20. 'University Students' Perceptions of the Internet: An Exploratory Study' (D' Esposito & Gardner 1999) explores college and university students' perceptions of the internet and internet resources; their criteria for evaluating information gathered from the internet; and more. [US]

21. 'A Visit to the Information Mall: Web Searching Behavior of High School Students' (Fidel *et al*. 1999) analyses web searching behaviour for homework assignments of high school students. [US]

22. 'Building a Better M.I.C.E. Trap: Using Virtual Focus Groups to Assess Subject Guides for Distance Education Students' (Grays *et al*. 2008) uses 'subject guides' to guide remote learners' access to digital resources. [US]

23. 'Do Off-Campus Students Use E-Books?' (Grudzien & Casey 2008) tackles an assessment of the usage of e-books by off-campus students. [US]

24. 'Toward an Effective Understanding of Website Users' (Harley & Henke 2007) compares two commonly used methods for exploring use of university-based web-based resources. [US]

25. *Use and Users of Digital Resources: A Focus on Undergraduate Education in the Humanities and Social Science* (Harley *et al*. 2006) aims to examine how understanding use and users can benefit from the integration of resources into undergraduate teaching. [US]

26. ‘The Year of E-Textbooks?: Many titles are available, but students are wary’ (Young 2009) challenges the supposed appeal and popularity of e-books among students. [US]

27. ‘Trends in Distant Student Use of Electronic Resources: A Survey’ (Kelley & Orr 2003) examines a needs assessment survey to examine trends in student use of library resources, services, and instruction, in order to understand how student usage patterns, needs, and preferences have evolved and/or stayed the same over time. [US]

28. ‘E-Metrics and Library Assessment in Action’ (Kinman 2009) examines five years of vendor-supplied e-resource usage data in conjunction with library and institution measures. [US]

29. ‘All In the Delivery’ (Kolowich 2011) discusses the various ways students can approach/use e-books, including the iPad in this category. [US]

30. ‘Children’s Use of the Yahooligans! Web Search Engine: I’ (Bilal 2000) investigates the cognitive and physical behaviours of middle school students in using ‘Yahooligans’. [US]

31. ‘Children’s Use of the Yahooligans! Web Search Engine: II’ (Bilal 2001) completes the investigation of the cognitive and physical behaviours of middle school students in using ‘Yahooligans’. [US]

32. ‘Differences and similarities in information seeking: children and adults as Web users’ (Bilal & Kirby 2002) analyses and the success and information-seeking behaviours of seventh-grade science students and postgraduate students using ‘Yahooligans’. [US]

33. *ECAR Study of Students and Information Technology, 2005: Convenience, Connection, Control, and Learning* (Kvavik & Caruso 2005) presents a broad overview and survey of student use of IT. [US]

34. ‘The use of online digital resources and educational digital libraries in higher education’ (McMartin *et al*. 2008).

35. ‘Engaging Secondary School Students in Extended and Open Learning Supported by Online Technologies’ (Nicholas & Wan 2009) summarises results from a survey of nearly 5,000 respondents, representing 119 US institutions of higher education regarding their use of digital resources for scholarly purposes. [US]

36. ‘One digital library, two undergraduate classes, and four learning modules: Uses of a digital library in classrooms’ (Pan *et al*. 2006) reports on an evaluation study on user experience of a digital library, based on a historical collection in two undergraduate classes. [US]

37. *Researchers and discovery services: Behaviour, perceptions and needs* (Rightscom 2006) assesses the use and the perceptions of resource discovery services by academic researchers in the UK, offering a representative portrait of user (including student) use. [UK]

38. *School libraries and teacher librarians in 21st Century Australia* (Rishworth & Knight 2011) is a review focusing on school libraries and teacher librarians. [Australia]

39. ‘Students’ evaluations of the use of e-learning in a collaborative project between two South African universities’ (Rohleder *et al*. 2007) reports on student evaluations of the use of e-learning in a collaborative project between two South African universities. [South Africa]

40. *College Students’ Perceptions of Libraries and Information Resources* (De Rosa *et al*. 2006) focuses on the perceptions college students have of libraries and information resources. [International]

41. ‘What do faculty and students really think about e-books?’ (Rowlands *et al*. 2007) reports on a large-scale survey carried out to assess academic users’ awareness, perceptions and existing usage of e-books. [UK]

42. ‘Use of Internet Sources in International Studies Teaching and Research’ (Selcher 2005) is a bibliographic review discussing use of online content, with particular to user behaviour e.g. common habits of quick glances, hurried scanning. [US]

43. ‘The effect of spelling and retrieval system familiarity on search behavior in online public access catalogs: A mixed methods study’ (Willson & Given 2010) examines the search behaviours of 38 university students, focusing on the necessity of offering spelling variations to students so that they might successfully complete a search. [Canada]

44. ‘Weaving the literacy Web: Changes in Reading from Page to Screen’ (Sutherland-Smith 2002) explores the on-screen reading strategies needed for the world wide web. [Australia]

45. ‘If we build it, will they come? Electronic journals acceptance and usage patterns’ (Serotkin 2005) reports on the acceptance of e-journals, access and user education. [US]

46. ‘Textbooks Go the iTunes Route, but Buying by Chapters Might Not Save Students Money’ (Wieder 2011) examines the rising cost of textbooks in light of the option of buying chapters via iTunes U. [US]

A4.2.2 ‘Somewhat related’ non-OER online resources

These are tagged ‘L1’ in the online bibliography.

It comes as a surprise to note that only a single one of the 23 ‘somewhat related’ resources in the following section comes from the UK; with both Canada and India now represented strongly along the periphery of our study’s concerns.

1. *Digital Opportunity: A Review of Intellectual Property and Growth* (Hargreaves 2011) explores the subject of intellectual property in the context of education and other areas, exploring copying and distribution in a digital world. [UK]

2. ‘Digital libraries: functionality, usability, and accessibility’ (Trivedi 2010) examines aspects related to digital libraries, notably ease of access, function and use. [India]

3. ‘Use and impact of electronic journals in the Indian Institute of Technology’ (Kaur & Verma 2009) describes the use of electronic resources and services at the central library of Indian Institute of Technology, Delhi, while asking who its electronic information services users are; how often they use the services; and from where. [India]

4. ‘Cultural Challenges in Developing E-Learning Content’ (Amir Azer & El Sherbini 2011) presents a case study for facing the cultural challenges of developing/using online resources. [Egypt]

5. ‘How digital libraries can support e-learning’ (Sharifabadi 2006) reviews e-learner expectations and the potential for digital libraries as critical e-learning supports. [Iran]

6. ‘Learning in an online distance education course: Experiences of three international students’ (Zhang & Kenny 2010) probes three international students’ experiences with, and perspectives on, the online learning environment at a large Canadian university. [Canada]

7. *The impact of a digital children’s literature program on primary students’ reading motivation* (Ciampa 2010) is a dissertation that addresses the promise of multimedia and internet-based reading software programmes in supporting students with reading and/or behavioural difficulties. [Canada]

8. *Educational Social Software: Social Learning 2.0* (Anderson 2007) illustrates the potential of social learning tools to support varying degrees of co-operative and socially enhanced learning in self-paced programming. [Canada]

9. ‘Teaching in an online learning context’ (Anderson 2004) focuses on the role of the teacher or tutor in an online learning context. [Canada]

10. ‘Information seeking in a multimedia environment by primary school students’ (Large *et al*. 1998) explored 53 students, working in small groups, searching digital tools during designated class periods. [Canada]

11. *Seeking Synchronicity: Evaluating Virtual Reference Services from User, Non-User and Librarian Perspectives* (Connaway 2011) is a project website to study and evaluate the sustainability and relevance of virtual reference services, which are human-mediated, internet-based library information services. [US]

12. ‘The Impact of Evolving Information-Seeking Behaviors Upon Research Libraries: A Case Study’ (Heath 2007) reflects on some of the efforts of one research library to respond to the pressures of the digital age while sustaining its efforts to build enduring repositories of the human record. [US]

13. ‘Turning the page: forget about those bulky backbreakers, digital textbooks are the future’ (Hill 2010) offers an overview of the digital textbook movement in the US, providing useful background material. [US]

14. ‘The Information-age mindset: changes in students and implications for higher education’ (Frand 2000) examines the evolution of young people as students in light of technological change. [US]

15. ‘What students want: Generation Y and the changing function of the academic library’ (Gardner & Eng 2005) presents four main traits attributed to Generation Y, discussed within the context of library use and satisfaction. [US]

16. ‘Presidents Are Divided on Best Ways to Measure Quality’ (Glenn 2011) explores anxiety among college presidents about the quality of teaching and learning on campuses. [US]

17. *Digital gaming as a pedagogical tool among fourth and fifth grade children* (Keeble 2008) is a dissertation examining the views of schoolchildren using digital games; assessing the games’ impact on achievement in mathematics and social studies; and comparing the students’ achievement during independent and teamwork scenarios. [US]

18. ‘US unplugged: manifold benefits of disconnected learning’ (Marcus 2011) reviews the limited classroom performance of students using laptops instead of paying attention in class. [US]

19. ‘State of Washington to Offer Online Materials, Instead of Textbooks, for 2-Year Colleges; Money-saving effort at 2-year colleges faces vexing problems’ (Overland 2011a) reviews an entire US state’s decision to use e-textbooks, and the challenges it must face. [US]

20. ‘Textbooks? So Last Century. Rent a Netbook Instead’ (Overland 2011b) explores the use of the netbook as an educational tool. [US]

21. ‘Elearning: What the literature tells us about distance education’ (Williams *et al*. 2005) outlines a short history of distance education, describes related media, and reviews research literature on achievement, attitude, and barriers to learning and learner characteristics. [UK]

22. ‘Texting? No, Just Trying to Read Chapter 6’ (Stross 2009) glances at the use of mobile devices to access course content. [US]

23. ‘Searching heterogeneous collections on the Web: Behavior of Excite users’ (Spink *et al*. 1998) reports on the results of a major study exploring users’ information searching behaviour on the Excite search engine. [US]

A4.3 Final note – on the *Notes* tabs

In addition to all the mass of material available, each paper in the Mendeley online database has a *Notes* tab alongside its bibliographic information. This may provide additional information but it must be stressed that such Notes were ‘work in progress’ and often written early in the history of the project – however, we felt that it would not be consistent with the ethos of Mendeley and the spirit of transparency in our project to delete the Notes fields.