

Networked Learning and Networked Information: Towards a Theoretical Basis for the Development of Integrated Information Environments

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ABSTRACT

In recent years it has become clear that networked information environments need to be closely integrated with the environments in which their users undertake their mainstream tasks and activities. The EDNER project, undertaking a formative evaluation of a major national information environment, provided an opportunity to explore the ways in which information resources were being integrated into learning and teaching within the United Kingdom. In this paper the Director of the EDNER project describes the work that has been carried out and summarises some of the key findings. The paper suggests that integration between different environments, including those delivering information and those supporting learning, is the key requirement. As we move towards ever more complex networked environments, including those driven by complex interactions between “objects” of many different kinds, it will be necessary to revisit the underlying theories and paradigms which have been developed by researchers and practitioners operating within their own areas of expertise.

Keywords

information environments; learning; digital libraries; evaluation

INTRODUCTION

Between 2000 and 2003, a multidisciplinary team from Manchester Metropolitan University and Lancaster University, UK, undertook a large-scale formative evaluation of the UK’s developing academic information environment, focusing on its development in support of learning and teaching. The approach taken in the *Evaluation of the Distributed National Electronic Resource* (EDNER) project was multifaceted, reflecting not only the differing backgrounds of members of the team but also echoing a very broad range of development projects, services and infrastructure within a complex environment which was both maturing and finding new directions during the period of the study. A general description of EDNER has appeared elsewhere (Brophy, 2002). The team reported to the Joint Information Systems Committee (JISC) in July 2003 and was asked to continue its work, with an even broader focus, for a further year to July 2004 – this is, at the time of writing, in hand.

EDNER was funded by the UK’s JISC as part of a large development Programme, known as 5/99, which was seeking to develop what was then known as the Distributed National Electronic Resource (DNER) to provide a greater focus on learning and teaching – in part this was a reaction to what had been seen in some quarters as an undue emphasis on the support of research and thus, to some extent, the Programme could be seen as a rebalancing activity. The nature of this DNER, which rapidly came to be restyled the ‘JISC Information Environment’, is discussed further below. However, it is worth quoting here from one of the documents produced when the 5/99 DNER Development Programme was set up

Although this data has been primarily used for research purposes, it is beginning to find a use in learning and teaching. However, this work has been slow and some additional funding would enable the JISC services to be used in totally different ways than originally envisaged. There is a strong requirement to improve the interaction between the people who are involved in the development of new learning environments and the national information systems and services being developed by the JISC. It is therefore proposed that an initiative be funded to integrate learning environments with the wider information landscape *aimed at increasing the use of on-line electronic information and research datasets in the learning and teaching process*. (Joint Information Systems Committee, 1999a. Emphasis added)

We were charged with undertaking formative evaluation at the Programme level i.e. to look at the overall development and its impact rather than the performance of individual projects or studies. In our terms, evaluation was concerned primarily with the outcomes and impacts of the services and projects we were investigating. Thus we were not so much concerned to assess the internal quality of products and project deliverables, but much more interested in the effects that these had on the user communities. Colleagues from the Centre for Studies in Advanced Learning Technologies (CSALT) at Lancaster University provided pedagogical expertise while the Centre for Research in Library and Information Management (CERLIM) at Manchester Metropolitan University undertook investigations from an information management perspective. The background to the pedagogical research approach taken will be found in Goodyear and Jones (2002).

INFORMATION ENVIRONMENTS

The JISC Information Environment (IE) is a particularly well-developed instance of an environment designed to deliver networked information services across a wide area – in this case the whole of the UK's higher and further education. The concept of an 'information environment' is relatively new, and derives from the shift of traditional, mainly paper-based information services – such as those provided by libraries – into networked spaces. Thus most 'information environments' owe their design to research into the concept of the electronic library or information service (see, for example, Owen and Wiercz (1996), Dempsey, Russell and Murray (1999), Brophy (2000), Brophy (2001)). In essence these approaches depicted the role of the information environment as linking together highly heterogeneous information resources with a disparate body of users. It was, in Owen and Wiercz's words, a 'knowledge mediator'. At this stage the models described were essentially self-contained, providing little explanation as to what these environments were, fundamentally, for. The user was essentially a 'black box' appearing at the end of a process of information transmission.

However, it has become clear as development has proceeded that a conceptual shift is needed in order to integrate information environments more closely with the other environments in which their users are working. Thus the JISC IE must be integrated with the research environments of UK academic researchers – such as the Grid – and, more to the point here, with the learning environments which students and tutors in UK higher and further education are utilizing. One might suggest that what is needed is an information environment seamlessly woven into each virtual learning environment, although terminological distinctions perhaps make such a concept very imprecise. Nevertheless that description would give a flavour of what is intended.

THE JISC INFORMATION ENVIRONMENT

The origins of the JISC Information Environment itself can be found in the eLib Programme of the mid to late 1990s (see <http://www.ukoln.ac.uk/services/elib/>). While that Programme had funded a large number of individual projects – alongside electronic information services organised nationally by the JISC – there was a lack of coherence so that the whole was perhaps rather less than the sum of the parts. In 1999, the JISC launched a new programme in which the term Distributed National Electronic Resource (DNER) came to prominence. In a Circular letter to institutions inviting proposals, it was stated that:

The Distributed National Electronic Resource (DNER) is a managed environment for accessing quality assured information resources on the Internet which are available from many sources. These resources include scholarly journals, monographs, textbooks, abstracts, manuscripts, maps, music scores, still images, geospatial images and other kinds of vector and numeric data, as well as moving picture and sound collections. (Joint Information Systems Committee, 1999b).

An early task for the EDNER team was to try and develop an understanding of what the DNER was and what it meant to its various stakeholders – just as it was transforming itself into the JISC Information Environment. The project took a number of approaches to this question. One was to analyse related concepts, ranging from VLEs and MLEs through digital libraries and museums to publishers and dot.com enterprises to identify commonalities and examine how these addressed the tasks and activities being undertaken by their users. At a practical level we worked with 5/99 project teams to elucidate their views on the intended outcomes of their work, encouraging them to undertake a number of exercises designed to surface their assumptions and critical engagements i.e. who among their intended user communities would need to be actively involved and committed if sustainable, positive outcomes were to be achieved. We were interested, of course, in outcomes which demonstrated effects on the practice of teaching and the experience of learning. Among the techniques used, a 'History of the Future' exercise (EDNER, 2002) was particularly successful. As noted in the Final Report, "a central point of our approach has been to help create a shared understanding of what project teams

thought would change in educational practice and how their actions would lead towards those changes” (Brophy *et al.*, 2004).

STAKEHOLDER PERSPECTIVES

The JISC IE addresses a very wide community with a range of very different perspectives. We therefore devoted considerable effort to an attempt to characterise these views and perceptions. The project’s Final Report (Brophy *et al.*, 2004) summarises these findings. In brief:

- Students are aware of the need to use information resources in their learning, but they define the quality of resources in ways which are quite different from the formal academic enterprise – so, for example, whether or not a paper is peer-reviewed is well down their list of priorities (Griffiths, 2003). This finding reflects that of Cmor and Lippold (2001), who stated that students will give the same academic weight to discussion list comments as peer reviewed journal articles. Rapid response to queries is important, while ‘satisficing’ – the ‘good enough’ syndrome – is widely apparent. Hence the widespread addiction to Google as the search engine of choice, over and above academically-oriented services provided within the JISC IE, such as the Resource Discovery Network (<http://www.rdn.ac.uk>). A further important issue for IE developers, though it will probably seem obvious to educational researchers, is that use of resources is linked to progression. However, we noted very few examples where the level for which a resource was being developed was part of the design of the project or service.
- We noted during our work that there was some evidence that academic staff’s awareness of networked information resources was increasing, yet conversely there seemed no evidence that this awareness was being transmitted to their students. A particular area of concern was over the presentation of resources to students, where there is no consistency of practice. In the past one might have expected modules to be accompanied by a more or less self-sufficient reading list constructed with intelligible if not always strictly accurate references to the subject literature. Now the availability of both the Web and various online learning environments has led to a situation where students are being pointed to a bewildering array of resources, many of which are out of date and which may be deeply embedded in other materials. Thus some academic staff would set up extensive web pages with pointers to useful online resources, but the contents would not infrequently be idiosyncratic and frequently out of date. As with students we noted that tutors make heavy use of search engines, particularly Google, rather than JISC IE services – which is not to say that the latter are not used. We also noted that there are significant differences between disciplines in tutors’ use of information resources in networked environments. Finally, it was useful to find evidence to confirm earlier findings (e.g. Wilson and Streatfield, 1980) that tutors make heavy use of non-formal information resources, including face-to-face and electronic discussion with colleagues.
- Another stakeholder group was the academic librarians, who are charged with the systematic collection, organisation and delivery of information resources in support of learning, teaching and research. Among the web sites we analysed, the library sites tended to be the best organised with a systematic presentation of information resources. However, librarians did not see it as their role to organise free, Internet-based resources but rather to concentrate on those for which they had to pay a subscription. This in itself raises an interesting issue about the ‘quality’ of resources, which we refer to again below. We also noted that relationships between librarians and tutors are generally weak, and that few librarians are significant players in the development of VLEs or of their components. Librarians believe that they have a key role to play in enabling students to acquire ‘information skills’ or ‘information literacy’; it is not at all clear that this is a view shared by their teaching colleagues.

- Our final major stakeholder group (though we could have explored many others) consisted of senior managers with responsibility for information and IT resources. What we found was that, apart from those individuals serving on the JISC's Committees or other working groups, there was a feeling of disengagement from the JISC's development activities. Although the JISC was felt to provide an important function, these individuals did not articulate a vision of how this fed into and influenced institutional development. In particular, the contribution they wished the JISC IE to make in the delivery of learning in general and e-learning in particular was unclear.

INFORMATION ENVIRONMENTS AND INFORMATION ARCHITECTURES

There is a close relationship between an 'information environment' and the underlying technical architecture or framework which enables and supports the delivery of services to users. Initially the thinking was very much about the architecture as enabling 'information objects' – books, journal articles and their equivalents – to be identified, requested and delivered. So, for example, integrated systems would be needed to enable an object to be discovered, located, requested, delivered and used. However, two considerations have led to a broadening of thinking in this area. Firstly, it has been realised that the concept of 'use' can only be represented meaningfully once it is unpacked and thus allowed to influence the whole design – use drives the nature of the systems required. Secondly, it has been recognised that in order to deliver information services in support of use we have to manage a whole range of objects which are not themselves 'information objects' in the sense described above. For example, we must manage people, rights, use processes, names/identifiers, relationships (between people, between objects, between names and so on) and policies. In treating all of these constituent resources systematically, it becomes apparent that the underlying architecture of an online information environment is very similar to that of an online learning environment, an online research environment or an online work environment. In each case the focus shifts away from specific content or content types towards interlocking processes. For example, an individual's rights need to be managed in a similar way whether the system is supporting a person's learning, research or information acquisition.

For this reason there has been an emphasis recently on exploring the relationships between environments that have grown up separately (IE, VLE etc.) but started to converge. The JISC's DiVLE Programme in 2002-3, which we also evaluated, is a case in point – this work is described by Markland (2002). An example of the convergence of interests is given by the work being undertaken to map learning object meta-data (LOM, SCORM etc.) and information object meta-data (Dublin Core etc.) – an instance would be UKOLN's work on mapping the collection description schema developed under the Research Support Libraries Group to IEEE LOM (see <http://www.ukoln.ac.uk/cd-focus/tools/rsplplom.html>).

LOCAL VERSUS NATIONAL & INTERNATIONAL DEVELOPMENTS

One of the issues for EDNER has been to attempt to elucidate the links between activity within a national framework, such as the JISC IE, and work being undertaken at the local institutional level. A second issue has been to try to develop understanding of why different countries have taken very different approaches to the development of information environments, although this work had to be deferred to 2003-04 and is not reported here.

During our work we examined the national and institutional priorities being followed by higher education institutions¹⁰. In the main we found that the JISC IE development work aligned well with national priorities, although some, such as 'widening participation', had perhaps been neglected. Here we should add that this should not be taken to imply that across the whole of the JISC's activities the same emphases would necessarily have been observed – work funded by the JISC Committee for Learning & Teaching (JCLT), for example, might have demonstrated a different profile but was not being evaluated.

We did not uncover a great deal of convincing evidence of planned or actual integration between the national service development and the student experience within the local institution, except perhaps in a few very tightly defined areas where a project was engaging with individual tutors. Instead we noted that IE developers often characterised their contribution as "improving access" to resources. There was little conceptual continuity between this notion and that of a learning experience. We concluded that there is as yet only a weak link

¹⁰ A complication was that during the period of EDNER's research the JISC acquired responsibility for further as well as higher education, although our focus remained – until August 2003 – on the former.

between the planned outputs of development projects in this area and educational practice. This in turn led us to conclude that development teams often need to spend more time elucidating their pedagogical beliefs and engaging with educational practitioners.

LOOKING AHEAD: SEMANTIC INFORMATION ENVIRONMENTS AND LEARNERS

An intriguing issue for the future will be to explore how developments in ambient information environments, including the development of the semantic web (Berners-Lee *et al.*, 2001) in particular, will affect the design of integrated user environments. Where objects and systems contain the intelligence required to predict a learner's requirements in advance, to offer personalised services ahead of expressed need and to deliver via a multiplicity of interactive devices, it is unlikely that the user will be able to discern a separate 'system' recognisable as an information, or a learning, environment. In such scenarios, with which many researchers are already engaging¹¹, the everyday living environment possesses the intelligence to offer all the services the individual needs. This suggests that there is a need for further focus on the interoperability of objects (whether they are 'learning', 'information', 'leisure' or whatever will be irrelevant), which in turn requires well developed ontologies to describe the properties of both objects and individuals (and collections and groups) and the relationships between them. This is a hugely challenging, yet exciting, agenda.

The implication of these developments is that we need to draw together pedagogical theories and paradigms, research frameworks, "cultures of enquiry" (see, for example, Byrne 1998), information – or even knowledge – environments, and broader concepts of living within a networked world with constant interaction with highly heterogeneous e-objects. It may be that, if the current emphasis on lifelong learning has long-term validity, we are starting to see the development of an integrated environment in which learning, research, work, leisure and indeed everyday life are able to interact and thus artificial barriers between human activities are reduced.

CONCLUSIONS

Returning to the EDNER Project itself, we have been able to explore a major national initiative in higher education from a number of different standpoints. We were convinced that the development has enormous value, but our role as formative evaluators gave us a remit to highlight issues where we felt the evidence showed that greater value might be obtained.

In particular we noted that the information environment means very different things to different stakeholders. Thus perhaps the greatest challenge is to reconcile differences of viewpoint, and to ensure that we are all talking the same language. In terms of learning and teaching it is clear that the provision of networked information services as very considerable value. However that value can best be harnessed if those involved at the leading edge of development commit themselves to exploring beyond the boundaries within which they have become accustomed to operate. So among our key conclusions were that:

- Development projects must go beyond the pursuit of an "access" agenda and must, from the very beginning, describe the ways in which they believe that learners can use their resources to enhance the learning experience.
- The outcomes of projects must be integrated into the learning activities designed by tutors so that students are actively engaged in turning the project's product into a vehicle for purposive learning.
- A pedagogical rationale needs to be made explicit so that those who wish to become engaged with the product understand how it is intended to lead to specific educational outcomes and what may be required on their part in order to achieve this.

More than this, we would argue that arising from the EDNER project and from the work of many other research teams who have been engaged in examining the potential of new, networked environments there is an opportunity to rethink the ways in which institutions, tutors, and learners engage with one another and each facilitates the learning experience. At the very least, as we have written elsewhere, "We need to explore how the student 'connects' between (a) course-unit-lecture-task view of the world and the information environment"(Jones and Brophy, 2002).

¹¹ The European Commission's current Information Society Technologies Programme, within the Sixth Framework Programme, is focussed on ambient technologies and is demonstrating considerable conceptual convergence.

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