Global Gateways: transforming learning through online knowledge networks

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Like the tools and machinery of the industrial age which improved productivity and quality of life, e-learning is important because it has the potential to revolutionise teaching and learning. In the ‘Knowledge Society’ gateways/portals are one of the tools that enable e-learning and the transformation of learning into a lifelong activity. ‘The role of the gateway portal service in this environment is essentially that of completing the e-learning circle’

Overview

This paper focuses on Global Gateways: A Guide to Online knowledge Networks <www.educationau.edu.au/research/global_gateways_v3.pdf>, a research report commissioned by education.au limited in 2003 which updates the earlier version published in 2001. The original report was launched at the Global Summit of Online Knowledge Networks <www.educationau.edu.au/globalsummit/> hosted in Adelaide Australia in 2001 by education.au limited, Australia’s national learning technology agency

This report provides an overview of educational gateways worldwide and articulates the characteristics and functions provided by the best gateways/portals. A section on global trends, based on a literature review, identifies a number of challenges confronting online knowledge service providers.

This paper outlines how the report has influenced the direction of education.au limited’s shared online knowledge services and discusses on key findings and discerned trends.

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Background

The advent of the Internet has provided us with a proliferation of online resources. Information on any topic is available to us at the click of a button. The problem is to distil what is worthwhile and authoritative. The gateway/portal evolved as a means to facilitate access to quality assured resources. Its primary aim is to assist information seekers by bringing order to the mass of material on the web.

The Global Gateways: a Guide to Online Knowledge Networks report, commissioned by education.au limited, was an attempt at mapping and evaluating online educational services around the world. The main task of the initial report published in 2001, was to find out what services gateways/portals were providing and why and how users were using these services. A major part of the report was an annotated bibliography of a selection of gateways/portals worldwide.

Due to constant improvements in information and communication technologies and the shifting nature of the Internet a review of the 2001 report was undertaken in 2003. This review aimed to update the original report and ensure the information provided was topical, relevant and reflected the developments that have taken place between 2001 and 2003.

This report is based on a literature review, an email survey of selected site administrators and an online search for new sites that adhered to the selection criteria for inclusion. The articulated selection criteria was developed to aid in the selection of new sites and in the review of sites included in the original report.

Global Focus

In line with developing and managing online services, education.au limited aims to be a leader in the provision of innovative learning technologies, particularly shared online content and services, and interoperability standards and interoperability for the benefit of Australian education and training learning community.

In order to achieve this goal education.au limited needs to be informed of current and future trends and strategically plan for and develop innovative services.

Along with current awareness and market intelligence activities, the agency participates and hosts national workshops and seminars to decipher current thinking and trends in the provision and development of online services for all education and training sectors in Australia.

In commissioning the Global Gateways research education.au limited has sought a global comparison of its educational services with those made available worldwide.

Gateways Research

The Global Gateways reports (published in 2001 and 2003) provide pertinent information about user patterns, some clarity in the terminology used by the industry to define online

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services and, most importantly, define the characteristics that distinguish quality online learning resource discovery and related communications services from other available services. The most recent report also informs education.au limited of future trends and challenges facing online providers, such as application of metadata, consideration of interoperability standards, emerging need for digital rights management, collaborative strategic approaches, and commercial competition.

EdNA Business Models

The initial report (2001), along with the outcomes of extensive stakeholder consultations, was most instrumental in influencing the re-engineering of the EdNA Online service. The main reason behind this re-engineering was to provide value-added services and economies of scale for our stakeholders, the Australian Departments of Education and Training. Three parallel business models based upon a Service Oriented Architecture (SOA) and related to information service delivery underpin the current EdNA Online service:

- Retail (one-stop-shop);
- Intermediary/aggregator;
- Wholesale.

These three business models provide the education and training sectors with access to a variety of quality assured information that can be accessed and delivered to their web portals and websites.

Aligned with the three business models is EdNA Online’s new technical architecture. The backend of EdNA Online is re-engineered in a modular, standards-based service-oriented model. It is comprised of the following components:

- EdNA Web Services – EdNA features are exposed as a set of web services. These backend services can be embedded in portals to deliver EdNA Online functionality that appears to come from the owner’s portal;
- EdNA Aggregation Services – EdNA Online is able to participate in distributed repository interchanges via a combination of harvesting and distributed searching;
- EdNA Portal – the retail end of EdNA online is exposed to end users, deploying portal technologies to facilitate a customized user experience.³

Key Findings 2003

The 2003 Global Gateways report addresses key questions about the nature and use of gateways/portals, such as the type of gateways/portals available, the range of services provided, target audience, purpose as well as general and broader trends.

Key issues that elicit debate include the need for greater interoperability and the development of metadata, and learning objects. The concept of learning objects is

attracting interest in the literature and a number of initiatives are currently engaged in the creation of learning objects.

Key trends identified in the report include:

- consolidation of gateways/portals;
- emergence of national/state school networks;
- increased personalisation;
- evolving nature of digital library;
- interest in learning objects;
- collaboration;
- e-governance.

**Type of gateway/portals (services, audience)**

Confusion still prevails about the use of terminology when it comes to describing and defining online services. Lonsdale⁴ infers that the distinction between different online services has become more blurred as online repositories continue to evolve and technology solutions become more sophisticated.

**Digital Library**

One example of this blurring is the digital library. The digital library has long been regarded as an information repository rather than an interactive service providing its community with tools to foster networking and information sharing. Literature suggests that in the past few years we have experienced the evolution of the digital library with the potential to offer a comprehensive service incorporating a knowledge database, digitised resources, live reference, email, chat room facilities, bulletin board, etc.

The evolution of the digital library can be attributed to the fact that the majority of subject gateways are developed and managed by the IT and library faculties of universities. Similarly, skilled people are managing both types of services. Furthermore, it takes time to adjust to new environments and libraries have had that time to adjust and strategically reposition themselves as online learning organisations. Literature indicates gateways/portals and digital libraries are increasingly occupying the same ‘cyberspace’.

**Enterprise Portals**

Another portal that is growing rapidly is the institutional or enterprise portal. The report argues that the broad social and technical changes that have taken place in society have impacted on education, particularly higher education. User expectations (students) are driving the integration of core campus functions and the deployment of student services. Portal customisation can provide a single entry point to online resources relevant to a particular institutional community, where users can access learning resources, course information, results, timetables, student advisory services and communicate with staff.

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Quality

The distinguishing features of the gateway/portal, as identified in the earlier report, are still key for the administrators of these services. The value-added features and services have always set these services apart from other websites and, include quality control of resources, the focus on enhancing the user experience, customisation of services and facilities and tools incorporated to facilitate collaboration and networking. However, the researcher predicts that if current trends continue, where there is commonality of services, the distinguishing features of gateways/portals will be in the quality of the interaction between user and collections.

Types of Service

A wide and diverse range of services is provided by education gateways/portals. The report broadly categorises these diverse services into four key types:

- content, (lesson plans, research articles, data, access to other information repositories);
- products (publications, CD-ROMS, online tools);
- communication (e-mail, chat, virtual interviews); and,
- site support (site map, subject index, search/browse help function, web statistics).

An additional feature of the quality gateways was found to be the encouragement of user interaction with other users.

The type of changes that have taken place over the last few years relate to appearance, structure, search and content, with an increase in the number of sites offering personalised services, such as e-mail alerts. Other changes include content management that simplifies web publishing and facilitates RSS (Rich Site Summary) feeds. School focussed gateways, in particularly, have become more safety conscious. For example the European SchoolNet replaced its pen-pal section with a safety-enabled version.

Users

The main users of these services are grouped into the broad categories of education and research, information technology, world of work and general public. The report is unable to make meaningful generalisations about attributes, such as gender, age, or socio-economic status due to the diversity and spread of services across countries. The most common method used to gather user information is through electronic statistical programs, supplemented by information gathered from online registration profiles, email surveys, training workshops and usability testing. Identifying a particular group of users is almost impossible as log files and user surveys, utilised by most services, fail to provide such information.

Usage Patterns

Usage statistics indicate that the most common use of the Internet was for e-mail purposes (nearly 70 per cent), followed by research materials (53 per cent), course materials (39 per cent) and news updates (16 per cent). The report found that young people are more likely to engage in messaging and downloading activities than older
people. Statistics from nineteen countries across Africa, Asia, Europe, the Middle East and North America endorse this finding, indicating that the most popular use of the Internet was social e-mailing. An interesting finding is the fact that in Europe, the Middle East, and North America, research was more frequently cited as a main Internet use.

User Behaviour

The report found that most users do not use advanced search features, or enter complex queries. The most common reason given for accessing education gateways is overwhelmingly information-related.

In short, gateway/portal administrators see the core business of gateways as being to add value to third party created resources, tailor their services and resources specifically for their audience, and through the provision of tools and applications, encourage the establishment of online communities.

Trends and Challenges

The key challenges confronting web developers and administrators along with policy makers are:

- interoperability;
- metadata standards;
- intellectual property;
- interest in learning objects;
- consolidation of gateways/portals;
- emergence of national/state school networks;
- increased personalisation;
- evolving nature of digital library;
- collaboration;
- e-governance.

The key issues confronting web developers and administrators of educational gateways/portals include the use of consistent metadata standards which promote interoperability, not only across sectors but on a national and international level. This is particularly so with the prominence of newly created content or learning objects. As is discussed later in this paper, a number of collaborative initiatives have been funded to create educational content in a format that facilitates reuse and re-purposing to meet specific conditions.

Intellectual Property

Intellectual property has become a key challenge, especially in the case of reusable learning objects. Solutions are needed to questions such as: How are the original producers of learning objects compensated? Who holds copyright and how is this protected? How can multiple uses be tracked? In cases of re-use of parts of content, what are the implications of this for royalty payments and acknowledgments? The increasing
production and usage of digital resources demands the development of sophisticated
digital object management and digital rights management systems.

**Privacy and Security**
Privacy and security issues are equally problematic. Users need to be reassured as to what
personal information about them is being captured, and how this is to be used and stored.
Service providers need to be vigilant about privacy and security issues and ensure they
have policies and procedures in place to avoid infringing the law and compromising their
systems.

**Quality Distribution**
Other challenging issues identified in the report include the production of good quality
learning objects, distributed approaches to development of web services, authentication,
and sustainability of services. Lonsdale points out that for most of these challenges, it is
not only important to develop the appropriate technology but also to collaboration at
national and international levels, across sectors, jurisdictions, institutions and disciplines

**Personalisation**
The report indicates that personalisation and customisation are functions provided by
good gateways/portals. To remain relevant and provide client focused services,
gateways/portals have progressively made use of technically innovative applications to
deliver targeted information.

Customisation is defined as the ability to manually configure an interface and create a
profile by adding or removing elements in the profile. Personalisation, on the other hand,
ocurs when a website monitors and analyses a user's behaviour and offers content based
on the patterns that have been tracked.

The aim of personalisation is primarily to enhance the relevance of a service provided by
anticipating user needs and thus improving the nature and quality of the interaction
between user and service provider. The author alerts us to the fact that despite the rapid
growth in this kind of service, it is still not known how well users will respond to
personalisation.

**eduction.au limited** through the EdNA Online service offers customisation/
personalisation to our audience, the education and training community, through free
communication tools. To date, 23 public and 44 private profiles (communities) have been
created on EdNA Online as a result of this service.

**Consolidation**
The research indicates that there has been consolidation of existing gateways.
Maintaining and growing a service is an expensive business. The report presents financial
considerations as the main reasons for services being discontinued or absorbed by larger
services.
Sources of funding for gateway services range from single annual contributions by subject related institutions to large consortia, through to government funding. Some gateways like Australia’s Agrigate and AVEL manage to survive through sponsorship and a combination of private funding and government grants. The demise of several gateway services is attributed to economic reasons.

**Collaboration**

Collaboration between online services, both formal and informal, continues to strengthen. Formal collaboration may be expressed by signing of an agreement, Memorandum of Understanding or ministerial involvement. Whilst informal collaboration may be expressed through an understanding to assist one another via promotional means or by participating in a pilot study.

The main advantages of collaboration include access to each other’s learning resources, sharing of knowledge and expertise, and keeping abreast of new and innovative developments. Two examples of successful collaborative approaches are: Denmark’s Electronic Research Library (DEL) project (31 libraries involved), and UK’s Resource Discovery Network (RDN) which consists of a federation of subject gateways.

*education.au limited* has established strategic alliances with GEM, MERLOT, Te Kete Ipurangi, European SchoolNet, British Council Australia and a number of local alliances with complementary organisations. Through these alliances *education.au limited* is able to enrich its existing collection of learning resources and provide one-stop access to a wealth of resources from a number of distributed repositories to its users. *education.au limited* is also collaborating closely in the areas of technical standards and exchange of expertise with like-minded organisations.

In Europe, international collaboration is reflected through the European SchoolNet with popular services such as the Virtual School, eschoolnet and the EUN communities.

A recent major European collaborative initiative, between national ministries, higher education institutions and corporate partners, is the Celebrate Project. This project will provide access to learning objects for up to 500 schools in six countries.

**Schoolnetworks**

Another trend identified in the report is the prevalence of school networks. As Lonsdale\(^5\) reflects, at the heart of the schoolnet concept is the transformation of learning and teaching through the use of information and communication technologies. The early school networks, established in Australia, Canada and Europe, provided connectivity. More recently, evolved networks in Brazil and Africa, with financial aid from overseas, demonstrate the possibilities for developing online knowledge communities in countries with limited economic resources and technological infrastructure.

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Learning Objects

Learning objects are defined as reusable resources, or chunks of small segments of learning content. Over the last few years there has been an increase in focus on the creation, distribution and management of learning objects.

Lonsdale\(^6\) asserts that delivery of online learning with learning object content reflects a shift from traditional teacher-centred and mediated lessons, that disseminated content to largely passive recipients, to student-centred materials mediated by online technology to encourage interactivity.

\textit{education.au limited}, and Curriculum Corporation (another Australian ministerial company) jointly manage The Learning Federation (TLF), a national initiative in developing reusable learning objects. This collaborative venture will develop high quality online curriculum content for use in Australian and New Zealand schools. Part of this initiative is also the development of a framework that supports the management and distribution of learning objects. The technical framework incorporates the development of comprehensive specifications relating to digital rights management, metadata application and management, and accessibility.

The report suggests several challenges to the development of reusable learning objects:

\begin{itemize}
  \item ‘There needs to be a greater level of granularity or consistency in terms of definition, format, scope, methodology, educational level and presentations.
  \item Teachers need to be trained in the use and purpose of learning objects. These need to be designed in such a way that teachers who are more used to traditional learning materials are encouraged to use them.
  \item The storage capacity of institutions needs to be developed so that the learning objects of other institutions can be reused.
  \item Learning objects need to be seen for what they are: self-contained learning activities that are a means to an end (learning) and not an end in themselves.
  \item Improved systems for categorising, locating and promoting these resources need to be developed.
  \item Learning objects need to reflect educational objectives without being constrained by specific curriculum.
  \item Digital rights management systems need to be developed.’\(^7\)
\end{itemize}

In short, the increasing interest in learning objects and the associated funding, particularly by governments, is evidence of the social and cultural changes that are taking place in education.

\textbf{e-governance}

National and state governments have implemented policies that have seen the development of departmental portals to enable the provision of government business

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\(^6\) M.Lonsdale, p.48
online. Australia, US and NZ have developed portals that deliver government information and services online from a single entry point.

The report indicates that there is little research into how frequently or why users access government sites. The most often given reason for accessing government sites is ‘for information’ followed by ‘to download a form’. The most common issues being pursued by users are in the areas of environment, education, health and social justice. In terms of increase in usage, the report cites Australia as one of the countries with the most significant increase – a jump from 15 per cent in 2001 to 46 per cent in 2002.

**Search Engines**

Another challenge that has implications for the survival of educational gateways/portals is the role that search engines, such as Google, play in resource discovery. The simplicity and efficiency of Google has revolutionised the way we seek information, although quantitatively it is overwhelming. The wide variety of electronic information systems, authentication systems in use, and search platforms, that make it difficult for users to search effectively across a number of sources, are reasons given for users turning to Google.

Lack of knowledge and sophistication by online users is another reason why users turn to search engines. A study of student web searching found that participants did not know how search engines used queries to search for information.

The author suggests the need for user education, that includes the organisation of information and a rationale for the different types of repositories and their use, as essential for e-learning to succeed.

**Conclusion**

The report suggests that educational gateways/portals are an integral part of e-learning. The strong emergence of networks and absorption of smaller services by larger services is viewed as a result of economic rationalisation. The importance of the gateways/portals is likely to expand rather than diminish, although there are also cautionary accounts about the need for constant refinement and enhancement of gateway/portal services to ensure relevance, quality and user satisfaction, and thus long-term survival in the face of increasing competition from search engines. By working collaboratively, not only on a national but also on an international scale, workable solutions can be found to the identified challenges facing not only developers and administrators of gateways/portals but also policy makers and governments.
Appendix

Agency in Context

*education.au limited* is a nationally owned agency governed by a Board consisting of nominees from the Australian Government, the schooling, vocational education and training and higher education sectors along with a number of special experts.

The Agency focuses on the cross-sectoral needs of Australian education and training as they apply to the Internet.

*education.au limited* brings value to the Australian education and training communities through:

- Managing large complex and innovative ICT projects in education and training that are national in scope;
- Working closely and collaboratively with stakeholders through professional relationships with a view to achieving mutual benefit;
- Utilising leading edge experience and expertise in Internet infrastructure development; and,
- National cost avoidance through building shared infrastructure for the provision of online content and services.

Currently the Agency manages a number of national services and projects. These include EdNA Online and its 18 related web services, myfuture, The Learning Federation, the Government Education Portal, performs the functions of registrar of the <edu.au> domain name and supports interoperability standards.

**EdNA Online**

EdNA Online ([www.edna.edu.au](http://www.edna.edu.au)) was the first online service managed by *education.au limited*. EdNA Online (Education Network Australia) is an Australian national cross-sectoral education project which supports, promotes and facilitates the use of Information and Communication Technologies (ICT) for learning, education, training, research and scholarship in Australia.

It includes a directory of online evaluated education and training resources accessible through a website, specialist collections, free collaboration and communication tools including threaded web forums, chat rooms and email discussion lists, noticeboards for events and conferences, and a range of education and training newsletters.

**EdNA Online** supports technical standards in education and training to enhance interoperability and provides support and workshops to enhance the development and implementation of metadata standards.
Government Education Portal

The Government Education Portal is the online entry point to a comprehensive array of Government information and services concerning all aspects and levels of education in Australia.

In particular, it focuses on national government policies, programs, events, publications and resources. It also provides links to key education and training sites at the national, state and territory level. The Government Education Portal also enables the Australian public to find and share information, news, events and ideas about education and training issues more generally.

myfuture

myfuture.edu.au, Australia's career information service, is a freely available service for all Australians interested in career exploration.

This provides the information to help people make informed career decisions and plan career pathways. Key features of the site are:

- a personalised career exploration tool,
- career information about courses, occupations, income, industries, contact organisations and the regional labour market
- help for those supporting others making career decisions

The Learning Federation

The Le@rning Federation (TLF) (www.thelearningfederation.edu.au) is an initiative of State and Federal Governments of Australia and New Zealand. Over the period 2001-2006, education.au limited, in a joint venture with Curriculum Corporation, manages the TLF initiative which is developing online interactive curriculum content specifically for Australian and New Zealand schools. The Initiative will support teachers in enhancing student learning thereby improving educational outcomes for students.

The project is developing systems, namely the exchange, content standards, and digital rights management, which will allow the input and delivery of high quality curriculum online.

The systems will also facilitate the breakdown of content into discrete 'objects' and the reassembly and repurposing of these to suit the particular needs of teachers and students.

<edu.au> Domain Name Registrar

education.au limited became the registration body for the <edu.au> domain in 2003. As Registrar, education.au limited provides domain name services in the <edu.au> domain name space and administer policies on behalf of the education and training sector