



THE COMMONWEALTH OF LEARNING

Best Practice in Education Portals

Research Document Prepared for
The Commonwealth of Learning and SchoolNet Africa

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TABLE OF CONTENTS

INTRODUCTION	1
A Note On Terminology	1
REVIEWING EDUCATION PORTALS ON THE INTERNET	3
GENERAL FINDINGS	3
Design and Navigation	3
Search	5
Support	5
Credibility and Authenticity	6
Currency	6
Target Audience	6
RANGE OF FACILITIES	6
Organisational Portals	6
Networking Portals	7
Resource-based Portals	7
ROLES FOR INTERNET TECHNOLOGIES IN EDUCATION	8
CONTENT	9
Delivery of Educational Resources	9
The Need for Strategic Choice	10
The Issue of Language	10
CONTENT SERVICES	11
Building and Exploiting Information Bases	13
CONTENT MANAGEMENT	15
COMMUNICATION	16
Facilitating Communication	16
Communication Services	16
COLLABORATION	17
Facilitating Interaction in Resources	17
Facilitating work-based Collaboration	18
PERSONALISATION	18
A FRAMEWORK FOR GOOD PRACTICE	20
Structure	20
Technical Set-up and Maintenance	20
Portal Details	21
Continual Content Intervention and Maintenance	21
CONCLUSION	21
APPENDIX A - Evaluating Education Portals - page 1	
APPENDIX B - Managing Curriculum Resources in an Education Portal - page 104	
APPENDIX C - Criteria for Evaluating Educational Software - page 120	
APPENDIX D - Content Production Process Flow - page 128	

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INTRODUCTION

A key feature of the ongoing growth of the Worldwide Web over the past five years has been a proliferation of web portals that focus on supporting school education. While many such sites require subscription and registration, there are large numbers that deliver services free of charge to anyone with Internet access. This research project has focused on identifying a representative sample of these sites, describing the services that they offer, and distilling an understanding of emerging best practice. In completing the latter task, we have not constrained ourselves to data gathered during this research project, although all of that data is attached as an annexure to this report. Thus, summary of the best ideas we have found – which is also informed by several prior years of research and experimentation by the South African Institute for Distance Education (SAIDE) – is presented in this report.

A NOTE ON TERMINOLOGY

The term ‘portal’ appears to have gained growing currency as a concept in recent years. The difficulty with this term is that it remains tantalizingly vague. As is pointed out in an article on Florida International University’s web site:

According to Doug Benzine, CUNA Service Group’s director of e-commerce, “There’s no one set definition of a Web portal.” He states that “The field is so new that all companies involved in e-commerce still are struggling with the definition and attempting to determine what kinds of business plans even would work in an Internet environment. They’re basically playing it by ear, forming the rules as they go along.”

Nevertheless, portals are defined by a few key characteristics. They seem to be hot sites on the Internet that serve as “search engines or robotic Web crawlers” that categorize information into directories making sense of the vast information confusion. It assists a user searching for a particular item sift through the endless sources of information. According to Leigh Gregg, “Today’s most popular portals started as search engines, but they’ve extended their offerings to include e-mail, chat functions, instant messaging, and even personalized service.”

An ideal example of a web portal is the infamous Yahoo!. Yahoo! is a search engine that has more than 35 million registered users and hosts over 2,200 advertisers. Yahoo! will be discussed further later on in the assignment.

According to MSNBC’s Web site, “These companies operate from a strategy that they will continue to capture the Internet’s biggest audience—the so-called “traffic.” Nevertheless, as is explained in the site, since the audience isn’t predictable, a web site’s traffic cannot be guaranteed. The main reason for the problem is that web surfers aren’t loyal to any one search engine. Web users utilize different search engines for different

tasks. The majority of the major web portals service the same audience. There is no clear distinction between web portals users, says MSNBC.¹

However, the following definition from whatis.com helps to cast some light on a meaning for the term:

Portal is a term, generally synonymous with *gateway*, for a Worldwide Web site that is or proposes to be a major starting site for users when they get connected to the Web or that users tend to visit as an anchor site. There are general portals and specialized or niche portals. Some major general portals include Yahoo, Excite, Netscape, Lycos, CNET, Microsoft Network, and America Online's AOL.com. Examples of niche portals include Garden.com (for gardeners), Fool.com (for investors), and SearchNetworking.com (for network administrators).

A number of large access providers offer portals to the Web for their own users. Most portals have adopted the Yahoo style of content categories with a text-intensive, faster loading page that visitors will find easy to use and to return to. Companies with portal sites have attracted much stock market investor interest because portals are viewed as able to command large audiences and numbers of advertising viewers.

Typical services offered by portal sites include a directory of Web sites, a facility to search for other sites, news, weather information, e-mail, stock quotes, phone and map information, and sometimes a community forum. Excite is among the first portals to offer users the ability to create a site that is personalized for individual interests.²

The above extract illustrates the term originated in commercial circles. This is potentially problematic because it indicates that the key purpose of a 'portal' is to offer services with a view to finding innovative strategies to make money from users. The problem here is not the objective of making money per se, but rather the fact that it becomes the primary objective and services are presumably then tailored to meet the needs of those from whom money can be made. Such a notion may well undermine over time the educational potential of 'portals', particularly if created for the developing world, as the paying markets for services tend to be limited. While the implications of this are beyond the scope of this paper, it is important to note the inherent tension, as the quest to make any education portal financially viable runs the risk of excluding already marginalized groups of potential users. This problem is likely to be of particular interest to Schoolnet Africa.

In presenting descriptions of best practice in education portals, we have chosen to take a broad approach to the concept. In effect, as the excerpts above illustrate, a portal can in effect contain *any* service available via the Internet. It is not limited to the Worldwide Web, as it can be expanded to include e-mail services, chat rooms, and other Internet applications not dependent on the Web. Thus, we have chosen to cluster together a comprehensive range of potential Internet services that might be delivered to users. We have, however, kept in mind the notion that a portal seeks to be a 'starting point' for web users. Thus, given that this report has been prepared for Schoolnet Africa and the Commonwealth of Learning, the descriptions below assume an intention to target school communities and create a portal that becomes the starting point for members of those communities.

¹ <http://www.fiu.edu/~fcarra01/definition.html#top>

² http://searchebusiness.techtarget.com/sDefinition/0,,sid19_gci212810,00.html

REVIEWING EDUCATION PORTALS ON THE INTERNET

A key task undertaken in this research exercise has been review of a range of existing education portals on the Internet. Detailed summaries of these reviews are contained in Appendix A to this report, while there is also a tool for evaluating online education software contained in Appendix C. Before going on to describe what services seem to make most sense for an education portal, however, it seems appropriate to begin by providing a brief overview of key themes emerging from that review.

Our web evaluations demonstrated that there is a range of web portals currently available. The various categories into which these portals fit are Networking Portals, Organizational Portals, and Resourced-based Portals.

- *Networking Portals* - a 'Networking Portal' is a web portal that provides various individuals (educators, learners, managers, and administrators) with a central point from which to access various educational tools and facilities (online and offline).
- *Organizational Portal* - an 'Organizational Portal' is a portal constructed by a specific organization whose core business is to deliver educational material
- *Resource-based Portals* – a 'Resource-based Portal' is a portal, which provides access to various educational resources online. Generally these types of portals contain adequate search facilities, links to other relevant organizations or institutions as well as subscription services.

In many instances, these services are merged in a single portal.

GENERAL FINDINGS

Design and Navigation

In terms of the design of the web portals evaluated, consistency throughout sites was noted. The majority of portals set their default screen resolution to 800 x 600 pixels, and the location, number and size of the graphics was also taken into consideration. Generally graphics were positioned on the top and left hand side of the screen. The readability of the text contained on the site, was determined by the clarity and size of the font used and the contrast between the background and the text. The majority of web portals evaluated demonstrated competent knowledge of design in these respects.

Navigability through the various portals evaluated was determined by simplicity and ease of use. The navigation through a number of the portals assessed was simple and easy to use, although some portals however did not contain an effective sitemap, which hampered navigation. The primary weakness of navigation arose when sites attempted to clutter too much information onto a single screen. The examples below illustrate this point.



Figure 1 – DiscoverySchool.com Homepage

Figure 1 illustrates a navigation structure that is difficult to follow. There is a great deal of advertising and information contained on the site, making it difficult for the browser to view specific navigation pathways. There are three main menus contained on this homepage, the first of these menus allows browsers to navigate through to specific resources designed for teachers, students, parents and then to the 'store'. The second allows browsers to navigate through to the other areas of the Discovery Channel Inc. contained in the site; 'Discovery Channel', 'TLC', 'Animal Planet', 'Travel Channel', 'Discovery Health' and 'Discovery Store'. The third navigation menu provides functional facilities to enable the browser to navigate around the site; 'site map', 'about us', 'feedback', 'privacy policy' and viewing and printing information from the site.



Figure 2 – Schoolnet South Africa Homepage

Figure 2 is an example of a simpler, more user-friendly navigation structure. The homepage design is clean and uncluttered and the main menu is clearly visible. There is no unnecessary scrolling down on the homepage. This menu provides links to the main sections on the site, which are ‘home’, ‘about us’, ‘solutions’, ‘news’, ‘education library’ and ‘resources’, these sections are then divided into various subsections for easier navigability. There is also a link back to main sections and the homepage from each subsection.

Search

Through the evaluations of various educational web portals, three different types of search mechanisms were found. The first of these is the ‘free text’ search, meaning that all documents containing a specific search word or phrase inputted would be retrieved. The second search mechanism is known as the ‘multiple’ search. In this case, by entering more than one word or phrase, the user would be able to retrieve all resources required. For example, searches on specific subject areas and grades can be combined. The third search mechanism searches not only a specific portal but also the Worldwide Web. The majority of the portals evaluated contained ‘free text’ search facilities, which is the most basic of the search facilities available. Some portals contained the date that the information was uploaded into the site and a provided a brief description of particular resources when found. Such facilities generally enhanced the quality of the search.

Support

Two different types of support were found through evaluation of the various portals – ‘Technical’ and ‘Professional Support’. ‘Technical Support’ was considered to be any

guidance given to help users to use various functions and navigate through the portal effectively and efficiently. Examples of these types of support include ‘built-in help functions’, ‘instruction sheets’, ‘tutorials’ and the contact details (particularly e-mail addresses) of individuals or organizations that might be able to provide the user with additional help. Contact details of various professionals in the field of education were considered to be ‘Professional Support’. Examples of these types of support include ‘online discussion groups’, ‘bulletin boards’, and contact details of individuals. It was found that both professional and technical support was provided through e-mail contact with various professional individuals and organizations in the field. Other forms of support were generally not used throughout the web portals evaluated.

Credibility and Authenticity

In order to ascertain the credibility and authenticity of the portals evaluated, we looked for contact details and information about the individuals or the organization responsible for the site. We also noted copyright restrictions, as well as sponsorship provided by reputable organizations (for example, Liberty Life sponsors the learn.co.za web portal). Generally a copyright restriction indicates that the individual or organization that has constructed the site has invested time and energy into the research and development of the site, and wants to be recognized for this. A number of portals evaluated failed to contain such information on the site and this made it difficult to determine their credibility. This point is important to note because proliferation of educational services online is suggesting a growing need for simple mechanisms to determine the credibility of those services.

Currency

The date that the site was last updated was used to identify the currency of information contained on the site. It should be noted that this date does not necessarily mean that the content contained on the portal was updated or modified substantially. Updates made may only be technical in nature. Another method used to determine currency of the information contained on the site, was through the examination of technical errors (i.e. ‘site under construction’, dead or broken links). A certain amount of judgment was also used, as some subject areas are less dynamic than others, and therefore regular updates may not be needed. The majority of the portals evaluated were current and up to date. The most frustrating error picked up was dead and broken links contained on a site, these are difficult and time consuming to find

Target Audience

A number of the educational web portals evaluated contained information, resources, and facilities specifically suited for educator needs. Far fewer portals contain information, resources and facilities suited for parents, learners, managers, administrators and school net workers.

RANGE OF FACILITIES

Networking Portals

The facilities that ‘Networking Portals’ contain are separated into different sections. The following list is illustrative of this:

- *Reference section* – generally the reference section contains various types of educational information and resources, as well generic resources such as a dictionary, encyclopedia and atlas facility.
- *Resource section* - the resource section is broken down into various categories, such as ‘generic’, ‘subject specific’ and ‘grade specific’ resources. These sections also include lesson plans, useful tools, books (online), library catalogues, and educational software.
- *Links section* - the links section provides access to useful websites. In some of the portals, links have been categorized into, for example, lesson plans, worksheets, links, resources, and so on. Links and lists of the various schools belonging to a portal/network are also normally included on a networking portal.
- *About us* - generally a networking portal has been established by an organization or a group of organizations, and their contact details are normally included.
- *Newsletters* - progress made on various projects which the organization or group of organizations are involved in is normally captured in this section.
- *Discussion groups* - discussion groups are also included on networking portals in order to address relevant issues.
- *Subscription section* - browsers are usually able to subscribe to various reports/documents distributed on a regular basis.
- *Support* – Support, both technical and professional, are often included on networking portals.

Organizational Portals

Generally these portals contain background information about the organization, its philosophy, funders, and members of staff. Information on various projects or research that the organization is currently involved in or has conducted in the past is also available on the site, as well as the publications that the organization has put together resulting from research. It should be noted that organizational portals tend to contain reasonable quantities of information, resources and materials (although there are exceptions), presumably because the organization has a positive reputation to uphold. Thus, failure to provide adequate resources or information may harm this reputation and affect other aspects of the business. These portals often contain many advertisements, which can be distracting and hamper navigation as they sometimes lead the browsers to other sites or web portals.

Resource-based Portals

A feature of many resource-based portals is that they provide subscription services, thus requiring people to pay before being able to access resources. However, a several resource-based portals have insufficient information regarding the various uses, benefits and financial implications of subscription facilities that they offer. The resource-based portal is subdivided into a number of categories, such as: Generic Resources, Subject Specific Resources, and Links to other Educational Portals. Thus, in many ways, resource-based portals are simply a sub-set of networking portals. The particular target audience that the portal has been created for is responsible for the sub-division:

- *Generic resource site* – a generic resource site contains generic teaching, learning and administrative tools for educators and learners, as well as managers and administrators within a number of topics and themes.
- *Subject specific site* – a subject-specific site contains subject specific information and resources. All of the information, resources and facilities contained on the site are specifically suited to teachers and learners of a specific subject, for example, Mathematics. The contact details of professional individuals and organizations whose

main specialization is in Mathematics would be included on such a site. Facilities to purchase subject specific books and resources are often also included.

- *Links to sites containing resources* – a ‘links portal’ links browsers to various other educational web portals throughout the country and the world. Generally these sites do not contain detailed information and resources they merely link browsers to other sites. Some of these ‘Links Portals’ contain a search facility in order to specify the type of site or information that the browser may be looking for. Help facilities or tutorials are also available to assist browsers search efficiently and accurately. In many cases a specific individual or organization does authenticate the value of the links contained on the site resulting in some of the links pages containing information and resources, which are of little or no intrinsic value. A clause stating this is generally posted on the site.

With the above broad overview in place, it is possible to consider in more depth possible educational applications for web portals. The ideas contained below have emerged both from the above review and several years of work in supporting rollout of Information and Communication Technologies (ICT) into schools.

ROLES FOR INTERNET TECHNOLOGIES IN EDUCATION

Globally, there has been a proliferation of activity focused on using ICT to enhance the efficiency and effectiveness of education systems. This activity has two broad stimuli. First, the technologies themselves offer extraordinary potential functionality that has stimulated an innate desire to understand how best these functions can support and improve people’s ongoing learning. Second, it has been stimulated by a series of problems that face education systems internationally. These include:

- Growing pressure on traditional education and training to provide access to far larger numbers of students, of all ages;
- A crisis of confidence in traditional approaches to education, which have often confused education with transfer of information; and
- Dwindling funding - in real terms - for education and training purposes in the public sector.

Inevitably, therefore, rapid development – and increasing convergence – of ICT has stimulated significant debate about the roles that these technologies might play in accelerating education. This is particularly relevant for developing countries, where several of the broad challenges facing education systems are magnified by a low skills base, significant resource constraints, and a range of non-educational social problems (such as widespread poverty and disease). This makes the creation and sustenance of any stable social system more difficult. In this context, it becomes important to consider carefully potential applications for ICT in supporting schooling. A primary opportunity lies in the creation of an effective online educational ‘portal’, building on lessons of portals being developed around the world, such as those summarized briefly above.

As we have noted, an online portal generally represents a resource gateway, which has been designed in such a way that it selectively filters and organizes useful, relevant information. In this way, a portal allows users to easily navigate towards areas of interest, as opposed to having to ‘surf’ the Internet in a random and less focused manner. In this way, portals foster effectiveness and efficiency in Internet use. In our view, a carefully considered educational portal should allow for the aggregation of relevant educational features and facilities.

CONTENT

Delivery of Educational Resources

Beginning with the functionality to provide resources, one of the most immediately obvious strengths of Internet technologies in a converging environment is the capacity to provide immediately up-to-date resources to large numbers of learners easily and relatively cheaply (whether one is using the Web or e-mail technologies). Changes made to resources can become immediately available to students without incurring major additional distribution costs. Likewise, communication resources, such as tutorial letters, can be distributed more often, thus reducing costs of ongoing communication by educational providers. These trends are already becoming increasingly important in a world where curricula no longer change in cycles of five or ten years (or even longer), but need to be adapted and updated continuously.

It should be noted here, however, that the capacity to facilitate quick distribution of resources should not be taken to imply an argument in favour of turning online environments into massive 'electronic textbooks' (although regrettably this appears to be how most web course designers tend to use the technology).³ There is no evidence to suggest that today's – or tomorrow's – students are going to be interested in simply reading textbooks on a computer screen. Thus, one needs to plan very carefully how to take advantage of this functionality without simply creating electronic textbooks (which most students are simply likely to print out and read in paper form anyway). It should be stressed here that resource distribution should not be mistaken for education, although it often erroneously is (most often by people whose understanding of education is as an authoritarian process of information transmission from educators to predominantly passive learners).

As an extension of the above strength, Internet technologies also support use of resources that combine more than one medium. While technical limitations still hamper the use of video resources (unless one is working within a reasonably advanced local or wide area network environment or is harnessing the bandwidth capacity of satellite), the ability to create multimedia resources – combining audio, graphics and images, and text - is a tremendous potential strength.

An additional benefit that Internet technologies can bring to designers of online learning resources is the huge resource base that resides on the Worldwide Web. In itself, this is of negligible educational value, but, if harnessed effectively by educators, it can become a very useful resource. This might happen, for example, through judicious use of links to resources on the Web or by setting learning activities that demand learners to make their own selective use of this resource base. As an extension, it is worth noting that this benefit can extend to course design processes themselves. This resource base can be harnessed to support course design and development itself, regardless of the nature of resources being developed. There is

³ Of course - the Internet does have the additional advantage that learners or educators would have access to a range of text-book like resources, and would be able to pick and choose from these without having to purchase a book. As the storage is the investment of the content developer, the user can potentially have access to a library of text books. Also, not all web-based educational resource development should seek to be new or make full use of the multimedia web environment (using graphics, audio and video clips, java applets, links to other resources and so on). The Internet can also be a good repository for existing volumes of educational content. Consider the lucrative practice of selling sets of past examination papers - common at grade twelve matriculation and in higher education institutions. Examination papers (or sets of assessment activities) are useful to learners and educators alike. Having a database of all such assessment activities that is accessible to all who care to use it could be a substantial resource contribution to any education system.

an emerging trend towards intelligent re-use and re-deployment in terms of content and course generation. This trend implies that fundamental principles of knowledge (learning objects) may be aggregated and re-purposed to suit the needs of a specific course (or curriculum) framework. This concept is explored further below and in Appendix D.

The Need for Strategic Choice

Before considering a range of possible content services that an education portal might provide, it is important to introduce a key strategic choice that needs to be made regarding a portal and its content. Essentially this choice revolves around whether or not portal planners decide to use their portal only to provide access to content available elsewhere on the Worldwide Web or whether the portal becomes a mechanism for organizing content commissioned and produced through the portal itself. Of course, the choice is not an exclusive one. A portal designed to organize and manage content developed by a portal project or organization can continue to provide managed and edited links to the best content available elsewhere on the Web. However, should a portal project decide to commission and produce its own content as a strategy for providing cost-effective access to locally relevant Web applications, this will require additional investment in building and managing information bases (as described above). Ultimately, this choice will involve balancing cost and educational effectiveness. However, it is a critical decision to take in preliminary planning for the portal, as it will have a significant influence on how budgets are constructed and money spent.

CONTENT SERVICES

One of the key problems with the Internet is the existence of massive volumes of information of little or no intrinsic value. This can make it particularly intimidating to a person who has few information literacy skills, effectively rendering it useless. The information contained on the portal should be relevant, accurate and current in order to meet the needs of the intended users. Intended users should be separated into various categories, such as educators, parents and learners, managers and administrators and school net workers. Each of these user groups or categories will have different information needs, which should be taken into consideration when putting together the information contained on the portal. Below are examples of possible relevant content services that could be offered by an education portal.

- *Online course catalogues* - online course catalogues should provide learners with information regarding possible learning pathways available online or at various physical institutions around the world, thereby providing browsers with ideas about the type of educational programmes currently available and allowing them to access information concerning a range of local and international learning programmes that may otherwise not have been accessible.
- *Online education courses* - online education courses should provide a means for learners to take part in courses, in which they may not otherwise have been able to participate. Online education courses would provide these disadvantaged users, with equal opportunities and create easier access to various learning environments.
- *Electronic library or online learning resources repositories*- electronic library repositories provide both educators and learners with access to various online resources and links to other sites (educational publishing companies, software developers etc.).

Access to educational material in Africa is difficult and expensive. Such facilities would enable browsers to access a wide variety of learning material found both locally and internationally. Browsers should also be able to search through resource material in order to locate specific types of information needed.

- An online learning resource repository should provide access to free resource material and information relevant to the users. Resource material and information such as worksheets, lesson plans, methodology and new trends should be freely available. Both educators and learners should be able to sift through documentation easily and locate the specific type of information needed with ease. Examples of resources that might be made available would include:
 - Resources for African educators, educational administrators, and policy makers. These would comprise lesson plans, teaching support resources, evaluation strategies, etc. It would be possible to search for resources according to resource type, content focus, linked learning outcomes, learning levels, and other relevant topics (more information on making this work is provided in Appendix D). In the spirit of reducing duplication, the portal should consist of hyperlinks to other Web sites, whenever information is available elsewhere on the Internet. It should not be designed with the intention of duplicating existing resources on the Internet. However, the primary focus of these resource links should be on content developed in Africa.
 - Resources for learners. Links to freely available resources such as online lessons and courses, supplementary educational materials, specialist content sites, online dictionaries, thesauruses, and encyclopaedias. Importantly, these links should focus on locally developed educational content that would be of benefit to African learners. Depending on the approach that a portal project takes to commissioning and producing its own content, this component of a portal could also be used to organize and manage online educational content produced by the portal project itself. Strategies for managing such a content store are outlined in Appendix D.
 - National and provincial policies. An African education portal could become the preferred point of access of all national and provincial policies linked to education, preferred because of the easy, searchable access it provides to an archive of all relevant policies. Each policy will be accompanied by a clear and simple abstract summarizing the relevance of the policy.
 - Curriculum archive. This facility could provide access to the latest thinking on school curriculum. It could be linked to the curriculum development ‘barometer’ mentioned above.
- *News Services* – another useful content service provided by many portal is a news service. In the field of education, such a service might include:
 - Breaking education news stories (possibly to be implemented in partnership with an appropriate mass media vehicle).
 - Notice board – the notice board could provide information about what is new on the portal.
 - Releases of the latest national and provincial government policies. This would obviously cover education policy, but could also be extended to include related policies.
 - Curriculum development ‘barometer’. This service could track the process of developing new curricula in different African countries, providing a simple overview of the latest developments and summary of how they affect teachers. Each step could

- be accompanied by links to any relevant detailed curriculum guidelines that have been generated.
- News flashes (a quick link menu) show casing 2-3 interesting sites on the Web – particularly those with an educational focus.
 - Link to appropriate mainstream news services – local and international.
- *Content Rating* – the ability for educators and learners to rate content is invaluable in identifying and improving content especially as the volume of content increases.
 - *Content Association Features* – certain classes of users, typically educators, could have the ability to create associations between content. This can be used to provide a list of additional resources to the user viewing the content. These associations can be extended to other data elements, for example content associated to a specific learner which can be used to suggest additional learning materials to specific learners or content associated with an assessment question which can be used to suggest revision material after the assessment should the question not be correctly answered.
 - *Content Alert Services* – although most content facilities of a portal require that the user is online, mechanisms for asynchronous interaction need to be considered to improve the efficiency of the portal. It is unlikely that a user will access a portal every day. Further, although new content may be added to the portal on a regular basis, content addition within a user’s field of interest might be less frequent. Thus, e-mail advisory services indicating that new and relevant content is available can be indispensable in reducing user frustration and improving use of the portal.
 - *Search facilities* – a primary objective of portals is to facilitate access to resources, either internally or externally generated, either curriculum-specific or general. In this role, a portal needs to provide all of the capabilities of a general-purpose, search engine for education resources.
 - Free-Text Search – retrieving content containing a specific word or phrase. Additionally, an advanced version of the free-text search would provide users with the capability to specify Boolean searches (for example, including phrase 1 and phrase 2, including phrase 1 but not phrase 2) and Date searches (content posted within the specified period).
 - Related Resources/Documents Search – retrieving related structured/formatted resources (for example, MS Word documents, Adobe PDF documents) containing a specific word or phrase.
 - Image Search – retrieving images containing a specific word or phrase.
 - Structured Search – retrieving content based on a defined taxonomy system, for example, all assessment content containing a word or phrase within Science at the Grade 7 level that forms part of the prescribed curriculum. When searches are performed, descendant inheritance needs to be provided for (i.e. when searching a particular node all descendant child nodes need to be searched as well).

Building and Exploiting Information Bases

In addition to the above, there is a further important trend worth noting. The rapid growth in functionality of Internet technologies opens possibilities for building and exploiting information bases in ways that were simply not possible even two or three years ago. In particular, the following developments are worth noting:

1. Developments in the digitization of information of all kinds, whether it be text, graphic, audio, or video.
2. Growing functionality of electronic databases, and particularly allowing people to:
 - Store any kind of information in digital format, with corresponding capacity to run increasingly sophisticated data queries on information once it is organized into a well-designed management information system; and
 - Run data queries - and receive the results of these queries – using HTML-based browsers, whether across the Internet or secure Intranets.
3. Exponential growth in the speed of central processing units and storage capacity of computer hard drives, matched with corresponding reductions in the relative prices of this hardware. These developments contribute significantly to functionality of databases, both in terms of quantity of data storage and speed of manipulation of this data.
4. Rapid developments in cheap electronic communication, more and more aspects of which can increasingly be automated. This is further facilitated by convergence in information and communications technologies, which allows communication such as e-mail or fax to work automatically in tandem with information databases if well designed.

Of course, the above sounds, in many ways, like the marketing jargon of information technology suppliers, elements of which have almost been repeated to the point of cliché. Indeed, such is the speed of communication and effectiveness of information technology marketing that, taken on their own, none of the above points necessarily even sounds particularly innovative, notwithstanding their relative novelty as developments.

Nevertheless, hardly any organizations or systems in African education have yet devised strategies for harnessing these trends effectively to the general benefit of education and social development, indicating clearly that their real potential is not yet well understood. Instead, repetition of rhetorical statements about the developmental potential of ICT soon starts to ring hollow, raising more questions than it answers. Nevertheless, it is worth noting that introducing the notion of an information base is here intended to provide one practical way in which Africa can seize the opportunity to take practical advantage of the potential of ICT. This is essential if we are to work towards reversing current trends for the development of ICT to entrench or widen the gap between developed and developing countries.

A fundamental shift in the value of information is taking place because of the rapid digitization of information and the consequent ease of its dissemination. Historically, information has been regarded as a product, which people were happy to purchase, to the financial benefit of those social structures that controlled and profited from its production and dissemination. While certain types of information will continue to retain value in this traditional way, the vast bulk of information, once it has been developed or collated, now rapidly loses value. Printed catalogues of information become redundant almost as soon as they are printed because this information changes so quickly. Cheaper and easier reproduction and communication of information constantly reduce the time that ‘privileged’ access to information provides strategic advantage. Access to multiple sources of information via the Internet is making it increasingly difficult to identify the source of new ideas, while the rapidity with which new information can be circulated reduces the time for which it can be regarded as ‘new’.

These changes make it essential to find ways to use information quickly in as many different ways as possible before it loses its value. These need to focus on re-using information in

different ways without generating significant additional cost. In order to achieve this, it is necessary to establish effective information systems, which can allow for quick and easy manipulation of information once it has been developed or gathered. It is also advisable from this perspective to incur the minor additional cost of breaking links between gathering or compiling information and communicating it. Although this creates some additional costs initially, these can easily be amortized across the range of options that then become possible for communicating this information or using it to support a diverse range of educational opportunities. In this way, the expense of generating the information can be used much more effectively.

Possibly most importantly, it becomes essential to develop effective strategies for storing information in ways that allow it to be very easily manipulated for future purposes. If information about educational resources, courses, and programmes is stored in a database, it then becomes easily available for future applications. In this way, research can build on growing knowledge bases, rather than repeating basic work already conducted. This can maximize the value of money spent on course design and development or educational research. It can then also – where appropriate - be easily made available via the Worldwide Web for access by other researchers in South Africa, thus contributing usefully to developing an effective educational resource and research base in the country. This has the potential spin-off of developing the country's international reputation as a producer – and not just a consumer - of information.

Another point emerging from the above discussions is that increasingly value lies not in possessing information, but rather in developing the skills and capacity to manipulate it effectively for new applications. This indicates clearly the importance of developing management information systems that allow for cheap, easy, and logical storage and retrieval of information. There is added benefit to creating interfaces to information that enable users to engage with certain types of information themselves with little or no intervention by other people. If a simple web interface is added to such a database, it would be possible for educators and learners to select their own search criteria and extract relevant resources very quickly and at no additional cost to a national education system (or an individual educational provider). This simple search level adds tremendous value as an educational resource. It is also very cost-effective, because changes made to the database are reflected automatically via the web interface. The lengthy processes of writing pages in HyperText Markup Language (HTML) are removed, because most pages can be generated automatically from the database

For all the above to work effectively, though, it will be necessary – at both systemic and institutional levels – to invest financial and human resources in:

- Establishing the types and combinations of information needed to support teaching and learning environments, target learners, and strategies for making this information accessible to all learners;
- Developing appropriate conceptual frameworks for computer-based management information systems; and
- Designing electronic database architectures that can be used to organize, store, and allow for multiple uses of information.

We believe that this has some important immediate applications in Africa, particularly in terms of building the capacity of certain systems to administer themselves effectively.

CONTENT MANAGEMENT

Large quantities of content are expected to be available through education portal – often from a diverse group of information sources and from numerous contributors. Effective management and use of this content will be a critical factor in achieving success and long-term sustainability. However, due to the need to incorporate as much relevant content as quickly as possible and eliminate the duplication of content already available elsewhere, the range, type, and format of content that will be used is likely to be very disparate. Formal, structured content authoring methodologies or systems cannot be enforced without severely restricting the amount of content available to the portal. Consequently, management of content, which is always deemed to be external, will require the following facilities.

- *Resources/Content Pool* – content available through a portal can helpfully be stored as a single pool of electronic documents (HTML files, Flash, PDF files, etc). This level of indirection is an important feature, as it de-couples the process of generating/authoring content from the process of publishing and managing content, each of which would occur independently, in practice. Issues arising from synchronization, choice of authoring tools, whether the content is owned or licensed and whether the content is internal or external become less relevant. This content is later ‘described’ to the portal and metadata about the content as well as taxonomy associations are specified.
- *Taxonomy* – a content taxonomy should provide for definition of multiple hierarchical taxonomy trees to which content can be associated. Taxonomy cross-references, where a relationship exists between nodes in different trees, have to be accommodated.
- *Content Upload* – contributors to the portal may be geographically dispersed and it is also unlikely that many contributors would be situated at the same physical location as the portal’s information store. Contribution should therefore be performed using a secure file upload facility.
- *Quality Assurance* – content submissions need not automatically be made available in a portal until approved by a content reviewer. Additionally, a rating feature could be available with all content, whereby users would be able to rate the usefulness of content with reviewers using this information to identify content that needs to be removed or redeveloped.
- *Malicious Content Detection* – contributions made could remain inactive or unavailable until scanned for viruses and other malicious software programmes. Technologies scanning inappropriate content (such as pornography, violence, and hate speech) need to be investigated and integrated.
- *Contributor Toolbar* – a significant component of content available through any portal will be in the form of ‘links’ to other online resource sites. These links might be posted on the portal by contributors who will specify meta information about the resource as well as associate the external resource with appropriate taxonomy items. This process can become laborious as the contributor will often identify relevant information while viewing a resource site and have to note the name of the resource, then log in to the portal and post the new content with its relevant information. To alleviate this and streamline the posting process, a Contributor Toolbar might become a useful tool. The toolbar, which would operate within a standard web browser, might permit contributors to make

submissions while viewing a resource – automatically submitting the resource to the portal in the background.

- *Rights Management* – requirements surrounding the management of copyrights will require an integrated rights management facility. This facility may restrict access to content based on a user role, track number of times the content is accessed or acknowledge the author.

COMMUNICATION

Facilitating Communication

The second set of strengths of Internet technologies is their capacity to support a range of communication strategies, especially easy asynchronous communication between educator and learner and amongst learners. This is possibly their most important educational advantage, particularly as it opens significant new opportunities for learners to engage with educators, hence supporting changing roles for educators.

Of course, as people who are familiar with the full range of applications of the Internet will know, technologies such as Chat Rooms or Video Conferencing do allow for live, real-time communication as well (subject to limitations of bandwidth). However, the major new strength of e-mail particularly is the capacity to facilitate ongoing communication at times that are suitable to the individuals continuing the conversation. Thus, students can post queries or ideas to educators, who can then respond at later times. Where appropriate, this communication can be extended to include groups of people rather than just individuals. People who have used e-mail and discussion groups for business or research purposes will know the benefits that this brings – as well as the time it can save by focusing discussion - and these benefits apply equally in education. Of course, this is not intended to suggest that such communication can replace face-to-face contact; however, it can be harnessed very effectively for a range of educational purposes.

In terms of educational systems, a major component of this strength is the capacity to support the many requirements for communication to ensure the effective management and administration of the system, many aspects of which are currently dysfunctional in African education systems. Cheap, easy, immediate communication opens significant new opportunities for circulating information through education systems (whether the system is a single university or a national schooling system), not least at administrative and management levels. This becomes particularly important in an environment where extensive and rapid change is underway, which, is currently the norm in many African contexts. Most importantly, cheap communication systems ensure that communication can travel in any direction through a system, rather than simply consisting of communiqués from higher levels to lower levels within a system.

Communication Services

The Internet can support public ‘online’ discussion in various ways, using posted electronic messages, which any connected person can read and to which s/he can add. These services could be made available through education portals. Such a portal should allow people access to existing news groups or public mailing lists (such as listserv and majordomo) of relevance to education in different parts of Africa. In addition, however, it should proactively stimulate

debate by creating new topics for online discussions, and providing the host computer facilities to support these discussions.

Discussion forums allow users to communicate with each other, to share interests, problems and ideas. These forums allow users to share ideas and build communities of practice with colleagues and other members of the education profession. It is suggested that, in piloting phases, portals test which forms of online communication users most prefer – listservs, bulletin boards, or live discussion forums – by providing services using each platform.

It is critical that regular discussion topics are established (subject-specific discussions, the use of ICT in the classroom, and so on), as well as that short-term discussions on topical issues are initiated regularly. Here, it is important to note that the history of online discussion is very limited in Africa, and there still remains a general fear of expressing opinions in such forums. Hence, if services such as these are to be effective, extensive work will need to go into ensuring that participants are recruited and that discussion is stimulated on an ongoing basis. Simply setting up the infrastructure will be insufficient to guarantee use. While Discussion Forums consist largely of user-created content, the success of these features is often reliant on the amount of maintenance and input given by the portal managers. Forums left unattended will either dissolve into chaos or dwindle into disuse.

COLLABORATION

Facilitating Interaction in Resources

Internet technologies can provide educational content developers with a range of very interesting opportunities for creating resources that allow learners different levels of interactivity. Of course, this can quite easily be used poorly but it can also lead to the creation of interesting and exciting interaction for learners with educational resources. Again, this is not intended to suggest that such interaction can replace all forms of direct human interaction; however, it can be used to engage learners effectively, creating richer teaching and learning environments. This can be facilitated by creative use of, for example, feedback forms, java applets, pop-up boxes, ‘yes-no’ and multiple-choice responses, and imaginative use of hyperlinks to guide learners through diverse learning pathways.

For example, in a printed resource, activities integrated into texts are usually immediately followed by some discussion of the activity, often discouraging learners from completing the activity. In a web environment, however, one could require some form of response from learners by developing this discussion about an activity as a response to a feedback form (thus requiring learners to submit some thoughts on the activity before seeing the discussion). To discourage thoughtless answers – and to encourage peer interaction – responses could be automatically collated and generated as an HTML page of student responses. Likewise, ‘yes-no’ responses could be used judiciously to guide learners down different, but equally relevant, learning pathways. In this instance, the response is used not to provide right or wrong answers, but rather to solicit information from learners on their particular preferences or concerns.

A requirement for many users is support in using various information services, whether these be primary and secondary source databases, library systems, or the resources themselves. Such services currently most often require direct interaction with the people who offer these support services, but there is a strong case to be made for providing online support services to

help users. This would include the development of: intuitive search facilities that are easy to use, but accommodate various levels of complexity in searching; guides on information sources and how to find and store information; electronic library guides; guides to using, accessing, and evaluating resources; support guides on writing assignments or reports; and online examples of interactive learning methods and approaches.

Facilitating Work-Based Collaboration

A managed combination of content and communication facilities in an education portal can lead to an enhancement in the levels and effects of information and resource sharing. Such a portal could become a platform through which educators and educational professionals collaborate on joint projects. Examples of this kind of collaboration include a Discussion Forum (bulletin board or real-time chat), which is geared towards bringing together teachers from different communities who are encouraged to share their experiences on teaching in the classroom or on the introduction of ICT into their schools and communities. Rather than merely acting as a forum for discussion, electronic exchange of resources could be fostered. In this instance, teachers might share locally produced lesson plans with one another. School administrators could make available school-specific policy and management documents, which they find to be of particular use.

This facility could play a critical role in furthering a continent-wide collaborative project approach for learners. Similar to the Think Quest project – both locally and internationally – an African education portal could provide learners with an opportunity to interact with one another via online communication facilities, as well as through the electronic distribution of primary learning resources and project material. It could also allow for new channels for guided social interaction, thus helping to foster communication between learners from different schools and communities, where previously geographic and socio-economic disparities conflicted with these efforts.

PERSONALIZATION

Emphasis has been placed on personalization as a means by which the right content is made available to the right person at the right time and as a mechanism to promote effectiveness and achieve long-term usefulness through ‘remembering’ the user (what s/he has done in the past, what information is within his or her scope of interest and which facilities are available to her or him). In order to personalize the experiences of users, the following elements require consideration:

- *User Identification* - each user, learner or educator, is assigned a unique account number and password combination that is used to gain access to personalized or protected features of the portal. This does not preclude general/public access to the system.
- *User Registration* – due to large numbers of expected users on portal, online user registration facilities that automatically generates user accounts based on information submitted by the user may become necessary to reduce administrative overhead. An optionally activated feature requires an administrator to manually activate the user account after registration and/or on confirmation of valid user details before the account can be used. This feature would typically be used to verify educators before permitting access to educator features. General demographic data about the user is collected at registration, such as:

- Name
 - Gender
 - Date of birth
 - Postal address
 - Telephone
 - E-mail address
 - Socio-economic status
 - Highest qualification achieved
 - Current educational institute, qualification, status
 - Learner/educator/administration
 - Areas of interest
- *User Security Policies* - configurable security policies governing acceptable use of the user account are:
 - Minimum user account length
 - Minimum password length
 - Password expiry period
 - Password reuse policy
 - Account lockout policy
 - Password lost policy
 - Inactive account policy
 - *Role Definition* – roles identify different classes of users and their corresponding access privileges. The definition of roles could be performed by class of user (for example, learner, educator, or administrator) and/or based on access to specific system features (for example, the ability to contribute content for Grade 9 Biology). Individual user accounts are in turn assigned to these roles and inherit all capabilities of the role (more than one role can be assigned to the same user account). To reduce administrative burden, standard predefined roles should be automatically allocated on user registration.
 - *User Administration* – administrators will require facilities to manage user accounts, for example locking accounts or resetting passwords. As the number of system users is often very large on a portal, delegation of administrative capabilities is imperative.
 - *Tracking Use* – collection of usage information can facilitate identification of system effectiveness, content quality, system weaknesses, trends and content that is/is not accessed frequently.
 - *User Aids* – additional end-user aids provided by a portal allowing personalization include context-sensitive bookmarks, notes, and feedback. The bookmark feature allows the user to build a set of her or his own bookmarks within the portal thereby allowing quick and direct access to useful information by later selecting the bookmark from a personal menu. The notes feature permits a user to store a personal note about the content that s/he is viewing and have the note redisplayed whenever s/he reviews the same content. The feedback feature allows a user to post comments about specific content to the portal content quality assurance team.

A FRAMEWORK FOR GOOD PRACTICE

As mentioned above the use of the ICTs within education provides numerous advantages, such as the increased accessibility, storage and distribution of resources and increased efficiency, reliability and ease of communication etc. Ideally an educational web portal should provide a platform that allows users to make use of all of these benefits, encouraging the act of teaching and learning to become as interactive and efficient as possible. In order for a web portal to achieve this level of educational value it should be tailor made to the specific needs of the user or users. A web portal should demonstrate knowledge of the specific information needs, structure and value-added services that are essential for the intended user or users.

Structure

The design of a portal should be suitable for intended users; and will need to be consistent throughout the portal. The content contained on the portal should not be cluttered, and should be clearly visible and easy to read. In order to achieve this, fonts should be bold and clear and colours should complement readability. Navigation should be simple and easy to follow, as users will not be able or willing to follow a complicated navigation system, which will prevent the portal from reaching its full potential as an educational tool. Page design should be congruent with the contents of each page to minimize unnecessary scrolling therefore enhancing navigation and facilitating the ease and quality of print jobs. Text should also be legible in various screen resolutions.

Browsers often become bored or irritated when portals take a long time to download or open on the web. In order to prevent this from occurring, the number of graphics or other large files should be kept to a minimum. This is not to say that these resources should not be included as they provide numerous benefits. It is however essential to find a balance between the numbers of graphics contained on the portal and the time that they take to download. Critically, hyperlinks to large resources should provide guidance on size of resources and likely download times.

Technical Set-up and Maintenance

In order for a portal to be accessible and functional, consideration must be given to its technical requirements. In brief, the following elements must be highlighted:

- Hardware – what host machine specifications are required based on the need for dynamic content (database-driven), as well as the expected number of portal visitors?
- Software – what software applications will be used to build the site back-end (database) and front-end (graphical user interface; screen interface? What are the software compatibility issues that must be worked through? When considering software adoption strategies, attention must also be given to the annual license fees regarding the use of particular software applications.
- Site hosting – what are the set up costs, as well as monthly maintenance fees? Where will the site be hosted? Who will be responsible for technical maintenance, over and above content and facility maintenance?
- What are the minimum end user configuration requirements, i.e. what hardware, software and network specifications must portal visitors have in order to access the site and its services and facilities?

Portal Details

A facility that provides information about the organization responsible for compilation of a portal should always be provided. Credibility of the information or resources contained on the site should be demonstrated by including the underlying principles and philosophies of the organization. The purpose or function of the portal should be clearly illustrated, allowing users to assess quickly whether or not the information or facilities contained on the site are pertinent to their specific needs.

A contact facility should also be provided to allow users to get in touch, in order to provide feedback and share ideas about the portal. The credibility and authenticity of the information contained on the site could also be verified by contacting the individual or individuals that may have published the information contained on the site or portal.

There should, wherever possible, be a support facility, preferably providing both technical and professional support. This should provide help with using certain facilities contained on the site and basic technical support, such as what software or ICT specifications are needed to browse the portal effectively.

Continual Content Intervention and Maintenance

The point has already been made that there is a massive volume of information on the Internet, which is of marginal or no intrinsic value. Consequently, there is no point in establishing a portal, unless there is a real commitment to creating and maintaining a site of very high quality. In order to attract people, effort needs to go into making the site accessible and interesting and into ensuring that it remains dynamic. Sites that remain static will simply not encourage return visits. Links to other sites on the Internet also need to be maintained as site addresses often change or the sites themselves are removed or become obsolete. Consequently, a portal needs to be established as part of a sustainable structure, and funding must be set aside specifically for its maintenance. The focus should be on creating and maintaining a web site, which is a world leader in education on the Internet.

CONCLUSION

The above document has attempted to provide a framework for good practice for developing an education portal, with particular reference to the schooling context of African countries. The document has provided a broad menu of options from which a portal design for School Networking organizations in Africa might select. This menu of options is accompanied by detailed information provided in the four appendices, which provide reviews of existing portals, cover frameworks for managing curriculum resources, outline criteria for reviewing online educational content, and detail processes for generating online content. It is hoped that this provides a comprehensive planning resource from which a portal for African School Networking might emerge.