

Evolution of Information Resources and Multimedia Services for Ecologists

A Case Study of Centre For Ecological Sciences @ Iisc.

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INTRODUCTION

The changes in technology, shifting styles of teaching and learning in higher education and expectations of the larger society, have merged to make of libraries something different. Libraries have used current technology to respond user demands, making major changes in the nature of collections.

Ecology is the scientific discipline (EGJ 1995) ¹ that is concerned with the relationships between organisms and their past, present, and future environments. These relationships include physiological responses of individuals, structure and dynamics of populations, interactions among species, organization of biological communities, and processing of energy and matter in ecosystems. Topics include the ecological bases for the conservation of ecosystems, landscapes, species, populations and genetic diversity; the restoration of ecosystems and habitats; and the management of natural resources. The increasing availability of CD-ROM (Barry 1995) ² based interactive multimedia packages to support learning in ecological scientist, researchers and student-centered cooperative learning. However, many of the current products do not make full use of the existing technology.

Interactivity in many packages has been limited to "point and click" rather than employing instructional strategies that immerse and challenge students. The Interactive package of

Multimedia has designed for problem solving skills, but also allow students to express their ideas with different forms of representation in their reports. The development of full-text databases, first delivered CD-ROM and later making of the accessibility of the World Wide Web, has enable libraries to offer their users huge collections they can view at great distances from the local library. Librarians neither predicted nor planned for the Web, but they have taken advantage of its power while challenged by its problematic qualities. Not available until the early 1990s but impossible to ignore by the late 1990s, the Web offers a watershed in the way libraries and their users connect

MULTIMEDIA REPORTING IN ECOLOGICAL SCIENCE PROBLEM SOLVING

This paper also reports on improvement of scientific understanding and improved problem reporting interactive multimedia packages. Developing a new multimedia database and identification system that can store and easily retrieve all sorts of species-related information: text descriptions, images (colour and black-and-white), sounds, movies, maps, synonyms, etc. According to Hedberg and Alexander (1994)³ have identified a number of dimensions which have appeared in the literature to define the growing ability of learning context to provide a sufficient range of legitimate practice. These dimensions might form the basis for the development of appropriate supports for learning from interactive multimedia environments. They include:

- Immersion - many authors discuss the concept of immersion and point to it as the major advantage of the interactive multimedia technology
- Representation - educational needs and the resulting use of faithfulness of representation has not received full discussion in the literature
- Active participation - the claim for active participation of the learner who cannot take a passive role in the interaction
- Creating an environment for practice - the crucial features of a traditional method of situated cognition: cognitive apprenticeships.

WHY ECOLOGISTS USE MULTIMEDIA?

Use of multimedia report that retain more information to understand the concepts, more rapidly and are more enthusiastic about what they are learning. With multimedia component ecologists often make new connections between curriculum topics, and discover links between these topics and the world outside the classroom.

MULTIMEDIA IS UNIQUELY SUITED TO

- . Take students on impossible field trips – Western Ghats Forests and National Parks
- . Take students around India, to meet new people and hear their ideas
- . Explain the science and environmental impact
- . Provide critical links between information and understanding

BY EXPLOITING THE MEDIUM'S POWER TO DELIVER IMAGES, TEACHERS CAN

- . Reach students with a variety of learning styles, especially visual learners
- . Engage students in problem-solving and investigative activities
- . Begin to dismantle social stereotypes
- . Provide a common experience for students to discuss

LEARNING STRATEGIES

It is generally accepted that most people learn best when actively engaged in the learning process. This approach has been the basis of much of modern curriculum development in Science education and current thinking about learning. A comprehensive overview of active learning provided by Bonwell and Eison (1991)⁴, with Boud and Feletti (1991)⁵ providing compelling evidence supporting the value and efficiency of such processes in classrooms are:

- . Cutting, pasting and manipulating text and media (graphics,

sound and video). This could be done in outline or spatial map format using text and /or icons

- Using screen titles and/or topics to organize information and the ability to connect and manipulate these, pull them together into a concept map or hyper map and
- Creating multimedia documents from information gathered.

TRAINING IN THE USE AND ITS APPLICATION

- Students perception of the relevance and value of what they are doing
- Students see the relationships between what they are studying and gain knowledge
- Students see the success of their efforts

TEACHING USERS HOW TO LOCATE AND EVALUATE ELECTRONIC RESOURCES

The reference desk may be reshaped for training sessions and classroom use for particular assignments or users needs. The technology is used to demonstrate what is being taught via multimedia projectors and individual or shared computers, and much of the content consists of showing users how to locate and evaluate electronic materials. Many libraries have posted tutorials on the library's Web site, and some have developed videos, CD-ROMs to provide instructions to those who do not attend class but access off campus and distance learners. These methods are quite costly because they require frequent updating. Some library Web sites offer tutorials to conduct research, developing search strategies, evaluating sources, and citing resources. Librarians prepare guides, pathfinders or tutorials for the library's Web site, with student's concepts and using online database. They clarify the differences between the organized, selected quality databases and the variety of information sources on the Web.

CHANGES IN COLLECTION MANAGEMENT

Libraries have moved to an on-line systems, electronic databases, and vendor connections; these changes have directly affected collection decisions. The criteria for selecting CD-ROMs; relevance, scope, need, currency, accessibility, language, cost;

vendors support; administration costs, maintenance, security; searching and system capabilities. The importance of license agreements and staff support as well as the hardware, software, and stability to be consider. Present criteria must take into account to serve remote users; copyright issues for multiple users; on-demand access versus holdings; and how-or whether- to archive and preserve digital materials.

The collection development policies should reflect cooperative resources sharing agreements; recognize new relationships among physical and digital information sources; and acknowledge the new forms of multimedia, including text, graphics, sound, video and animation all of which are available globally. The selection of electronic information resources is more complex than traditional print resources because consideration must be given to equipment, relationships to print resources, and ongoing local and vendor support. General guidelines, according to White and Crawford (1997)⁶, include the following:

- . Relevance and potential use of the information
- . Redundancy of the information contained in the product
- . Demand for information
- . Ease of use of the product
- . Availability of the information to multiple users
- . Stability of the coverage of the resource
- . Longevity of the information
- . Cost of the product
- . Predictability of pricing
- . Equipment needed to provide access to the information
- . Technical support
- . Availability of the physical space needed to house and store the information or equipment

Collection management is becoming more complex, and the librarians now have to be knowledgeable about server space and operating systems. Special problems may rise due to the multiplicity of electronic forms. Library co-operation remains difficult because size of local collections and budget.

Internet resources constitute one of the newer collecting areas they too need to be carefully compared and evaluated, selected and presented in a coherent manner if they are to be accessible and useful to an academic audience. Three recent articles recommend criteria by which these resources may be evaluated (Piontek & Wolfe 1996)^{7,8}. These include the following:

- Quality or value
- Ease of use
- Content or coverage
- Cost
- Hardware and software requirements
- Currency, frequency of updates
- User knowledge requirements
- Expertise of producers
- Relation to other resources
- Format
- Copyright considerations
- Stability and reliability

JOURNALS CHANGES DUE TO ELECTRONIC RESOURCES

Due to compactness users search CD-ROM with Boolean operators and sort the results. While linking CD-ROMs on local area network, World Wide Web access to allow multiple users simultaneously.

Since a decade pioneering institutions started providing access to electronic journals over the Internet. Most research institutions, academic libraries have followed by the following basic issues: How access can be provided, developing selection criteria and incorporating e-journals into traditional collection development policies; whether to store or archive electronic journals, developing appropriate acquisition procedures; how electronic materials should be indexed and cataloged, and staff training and other resources costs. Many libraries have been started subscribe electronic full-text journals to cut costs. Some users start asking even back issues on electronic resources. In many ways, electronic journals are leading the collection management. Their growth in numbers and high-visibility make more value.

On-line journals should be high quality, represent good value and meet the user needs like other library materials. The importance of quality of the journals includes full-text, accuracy of indexing, and compatibility with existing library systems and resources. With the arrival of E-journals, ease of access, cost effectiveness, availability for 24 hrs, etc made it necessary for CES to have access to e-journals the CES Library have a very good collections of E-journals, all the e-journals are subscribed by the JRD Tata library, some of the full-text e-journals are as follows: American Journal of Obstetrics and Gynecology, Applied Soil Ecology, Behavioral Ecology, The full-text e-journals are accessible only in campus which is connected with LAN facility.

ELECTRONIC BOOKS

The introduction of new technology of E-book, librarians are reselecting the book, which are already selected in another formats. Since the last one-decade librarians made decisions to buy journals and newspapers in e-form for archiving and preservation purpose while other titles were kept in bound print volumes. Now they are buying some books in electronic format that are already in print format on the shelf. The same is the case with CES Library. If libraries have been slow to adopt this new technology, waiting for more fully standardized hardware and software, changing at least partly due to user demand. While acquiring commercially produced electronic products, print materials and local collections must weigh the needs and institutional priorities.

Gartz (2000)⁹ considers digital conversion as a preservation technique and how the process of selection for digitization differs from selection for traditional preservation activities. She finds that digitization offers enhanced, wider, easier access than microforms or photocopies, and it can capture color, sound, movement, and other features that traditional preservation reformatting has not handled well. She notes that the Arizona State University Library, Columbia University Libraries, the Library of Congress, Smithsonian Libraries, the Society of American Archivists, the University of California, and the University of Illinois have prepared selection criteria for digital conversion. The most important criteria are as follows:

- Does the item or collection have sufficient value to and demand a current audience to justify digitization?
- Do we have the legal right to create a digital version?
- Do we have the legal right to disseminate?
- Can the materials be digitized successfully?
- Does or can digitization add something beyond simply creating a copy?
- Is the cost appropriate?

The influence of traditional concerns with digital techniques for conservation is most challenging. The effect maximizes the strengths of both analog and digital technology. The E-Books are one of the easy accessible electronic resources; they are linked in ebrary (linked in JRD Tata library). Few titles are listed below; Building an Effective Environmental Management Science Program: Issues in Environmental Science and Technology: Global Environmental Change, Environmental Science in the Coastal Zone: Issues for Further Research, etc. The full-text of e-books are ready electronic resources; user can directly copy and paste the required information to their needs.

CD-ROM COLLECTIONS IN CES

CES is one of the first departments to buy CD_ROM owing to its inherent requirements already described which is concerned with observational study. The electronic resources of CD-ROM are made available in CES library. Few of them are: Changing Climates, Developmental biology, Digital image processing, Earth systems today, Ecology and natural resource management, Encyclopaedia Britannica, Energy and environment issues, Forests, LIFKEY-LIFDAT, Maps of India, Microbial life, National Geographic, Statistical outline of India, Urban environmental issues. The users access this collection regularly. The CES have been regularly releasing the Technical reports. The work is under process to make a soft copy and store them in CDs and make available to search through the Web. At present the bibliographic search is available, we are trying to give the full-text of the technical reports. More about the CD-ROM development at CES will be given in section 9.

ELECTRONIC REFERENCE SERVICES

The CES Library while moving towards managing electronic information, the collections changed along with the services. It has used current technologies to provide resources to remote users; the number of users coming into libraries and requesting reference assistance are still not down. In response, reference services now include not only person-to-person discussions but also more phone and electronic reference. In addition to the traditional reference, spent time to teaching users how to locate and use electronic materials, e.g. citation indexes, full-text journals and books. Library Web sites are commonly used to provide basic ready reference information.

In the electronic environment students and other library users want the information immediately. Students expect answer for every question and do every research project online. Librarians agree that new technologies help improve reference service immeasurably, but they have feelings of being overwhelmed, finding it hard to keep up with the many varied available tools. In the present situation, the librarians have moved from interviewer and searcher to teacher and facilitator to get the clear idea of the new technology. Now reference staffs focus on teaching, preparing guides to searching, creating web pages with links to electronic resources, and evaluating and negotiating prices for online products. Interacting with the faculty for curriculum development is important.

REPROGRAPHIC SERVICE

The electronic equipment device of photocopy machine is made available in the CES Library. It provides the service like photocopying, scanning, print, and send e-mail.

ROLE OF LIBRARIAN

The important role of the librarian is to knowing what is available online and the value of those resources. In many instances users have access online than print copy, so libraries have moved from print on paper through microform for space saving, CD-ROM and then Web access for convenience. In recent years, librarians need to become knowledge managers rather than collection managers. They must manage the interactions

of the print and the electronic information systems. The basic mission has not changed. Librarians are still responsible for surveying the universe of information resources, now in both print and electronic form, and selecting, organizing and preserving those resources that constitute the record of knowledge. The role of collection management has shifted from physical collections to intellectual content. In order to make the print and electronic systems work together and to build electronic collections cooperatively, a new perspective is needed. The creation of electronic provision centers to serve specialized, regional, or national collection needs, and manage the challenge of local access to global collection.

The emerging electronic environment's growing demand for remote access motivated in growth of distributed education. Librarians are trying to make electronic resources, Web-based reference services, online tutorials and as many other services as possible is made available remotely. Weighing the necessary elements in making these decisions is not easy. Wolpert (1998)¹⁰. present a strategy for making delivery decisions based on local conditions, pricing, feature options, hardware costs, and network availability. They look at the following criteria in the decision making process:

- . Output options
- . Search interface
- . Search options
- . Contents, local issues
- . Upgrade planning

Identifying remote users and ownership, how to pay for electronic resources, and which equipment supports new technology to look at who uses electronic information resources, their attitudes and the environment in which resources are used, what these users need and expect, and how resources and services compare to other service providers. The very important work is to give access online equipment and ILL to the distant users than others. In the late 1980s (Hamaker 1996)¹¹ librarians cautiously tracked costs of online searching, by the early 1990s many libraries were already used to nonrenewable of serials, increased ILL and document delivery services, and expanding

electronic access. Even in a fully digital environment, scholars will require assistance. They will need librarians' interactive skills. However librarians must focus on user needs. Many library users have difficulty understanding the different database interfaces. Confusing to users are the differences between commercial and free databases on the Web. Why some databases can be accessed free and others cannot. While connecting the online databases and Web sites mention passwords, why license restrictions, and so on. The common idea is the Web is a big free library, to find something useful among the wide range and to understand that many quality items are accessible only if paid for by someone, that is usually the library. The next section describes the CD-ROM developed at CES as part of its information service.

LIFKEY LIFDAT (A multimedia developed by CES team)

Enter the Portals of India's Wealth of Plant and Animal Life

Would you like to name and know more about a plant or an animal you have come across? Better appreciate how it looks, fits in the world or behaves? This software would help you open the doors to the fascinating world of diversity of life. Life key is an information age version of a natural history field guide such as Salim Ali's Book of Indian birds. So it takes advantage of computer power to lead one interactively to the identity of a plant or an animal. Moreover, it offers a list of possibilities in descending order of likelihood, so that even if the information is incomplete, or partly in error, the correct choice is likely to figure in the list. It also takes advantage of multi-media capabilities so that one may not only see colour photographs but also hear animal sounds and see video-clippings as well.

The interactive identification key software LIFKEY and the associated database LIFDAT are so designed as to be capable of continual improvement and development. This first version in English includes 100 bird and 260 plant species. We are also developing versions in all languages. The source code of lifkey as well as the lifdat database will be made available to the public to develop it further as free software. Lifkey-lifdat is being offered at cost price as part of a mission to promote biodiversity science

as a people's movement. Furthermore, all are welcome to copy and distribute this material on their own, provided the source is duly acknowledged.

AUTHORS

A team at the Centre for Ecological Sciences of the Indian Institute of Science, Bangalore 560012 has developed LIFKEY and LIFDAT. S.Srinidhi holds the major credit for the development of the computer code. V.V.Sivan, K.A.Subramanian, Harish Bhat and Madhav Gadgil are responsible for the development of the database. This is one of the outputs of Project Lifescape of the Indian Institute of Science and Indian Academy of Sciences under the overall direction of Prof. Madhav Gadgil.

ALL ITS REQUIRES

- Multimedia PC with Pentium 233 MHz or higher processor
- Microsoft Windows 95/98/2000
- 25 MB of available hard disk space
- CD-ROM Drive
- Super VGA display with 256 colors or better
- Mouse or compatible pointing device

We invite all nature lovers, especially the young inquisitive minds to try out this package to explore the rich natural world around us. Not just to explore, but to become partners in enhancing the quality, scope and usefulness of this whole enterprise. For further information please visit <http://ces.iisc.ernet.in/hpg/cesmg> or send e-mail to madhav@ces.iisc.ernet.in or for avail the copies to kanade@ces.iisc.ernet.in. We welcome all inputs including offers to help in improving the quality, capacity and reach of LIFKEY-LIFDAT.

FUTURE OF MULTIMEDIA

In the past decade there has been an exponential growth in the use of the Internet, portable computers, and wireless telephony. It is expected that this growth will continue in the coming years. Currently, to access Internet, we need to connect

our computer to some fixed point (home, office, library, school etc.). Increasing variety of wireless devices like digital cellular phones, or handhelds calls for IP connectivity on the fly. Possibilities and potentials of such mobile computing are enormous.

To bridge the gap between print and electronics complex system design and to exploit the most advanced components for low-cost multimedia resources. Students to gain valuable experience with best-in-class verification solutions, and to better prepare the next generation of real-world experiences. It becomes an increasingly critical part of the overall design of multimedia. Encourage students call for regular technical papers, special topic sessions, panels, tutorials and university / institutions design contest entries. The annual conference, which promotes advances in design automation software and hardware for electronic sources.

MULTIMEDIA DEMANDS

Today, because users expect high-quality multimedia performance as well as the ability to place voice calls, the addition of new services is key to the successful future of many network operators.

TECHNICAL CHALLENGES AND CHOICES OF MULTIMEDIA

For the wireless world, third-generation (3G) network designs hold the answer to gaining higher connection speeds and delivering true multimedia services to end users. Now, the challenge for designers is developing these products.

CONCLUSION

Current interactive multimedia technologies can represent ideas in almost any mediated form, and we can generate our functional options and the knowledge structures, the student can roam through the resources creating their own meanings and understandings. This rich context allows working with authentic problems and practice. The major focus is one can manipulate the tools and also extend common concepts such as copy and paste into other forms of representation of information.

With graphical and visual display coupled with large databases of resources, it is possible to explore an information space in whatever sequence they want.

The essence of librarianship is not limited to books or printed documents, but encompasses the provision of information and services in many varieties. As scholarly communication changes and as users' need change, librarians and libraries must also change to meet those needs. They will have to be flexible enough to continue changing, adapting to change. Libraries' parent institutions are changing as well as the larger society. User demands and expectations affect library activities and choices. Technology has dramatically changed the nature of librarian's work, making us far more dependent upon hardware and software, campus network choices, and technical staff expertise, as well as on aggregated collection remotely accessed.

The next two decades will see equally greater changes than the last two decades. Popular discussion of libraries suggests that the Internet will replace by the Internet. Librarians must continue to reassess what they do and why they do it, instead creatively moving forward, setting the standard and not merely reacting. Looking over the literature on the 20 years, one sees as impressively question its past terms while adapting to the changes. Librarians have decreased buying power, limited staff and all other resources, and trained and retrained to adapt to new challenges. If that strength can now be added in facing issues and creativity in resolving them, it will be an encouraging record with which to face the future.

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