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Electronic, Digital and Virtual Libraries: Review of Concepts and Distinctive Differences

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Abstract

There seems to be confusion among librarians regarding these three terminologies associated with library and information science discipline: Electronic Library, Digital Library and Virtual Library. In this paper, the authors have succinctly distinguished the trio by presenting their definitions as viewed by different authors and by discussing the characteristics of each of them. Examples of electronic, digital and virtual libraries (including indigenous and overseas) are given. Also advantages of each of the libraries are listed under each theme. Also the disadvantages of digital library and virtual library are listed. The authors conclude by pointing out the distinguishing differences between the identifiable types of Internet-based libraries.

Keywords: *Electronic library, digital library, virtual library, Internet resources.*

1.0 Introduction

The terms digital library, electronic library, and virtual library are often used interchangeably. It was in the late 1980s that the term *digital library* arose and evolved within the broad library community. During that period, according to (Paulhaber, 1996) many physically based academic libraries initiated innovative long-term projects to facilitate access to their continually expanding hardcopy collections. These programmes integrated emerging information technologies with traditional printed materials, thus making libraries among the first integrated users of alternative media such as microforms, audiotapes and other sound recordings, and electronic files – all predecessors of today's online commercial database systems and aggregated digitalized

collections. Today, by most measures, the term digital library when used in this broader sense has won the day in terms of the part of many information professionals that the word *virtual* was so vague. Virtual library, however, is increasingly the term of popular choice when one refers to the aggregated digital learning resources and librarians-assisted services that support the curricula offered by online or virtual universities. Increasingly, librarians who may support distance learning as found in more traditional and residential universities will also employ the term *virtual library* when referring to the amalgamation of resources and services which they provide their students at a distance. While there are no limits on the size, content, or relative value of data afforded students by a virtual library, its definition is always shaped by the pedagogical needs and expectations of

its parent learning community (Garten, 2010). It is based on the observed varying perspectives on the terms that this paper seeks to make analytical review in order to distinguish both seeming and verifiable differences among electronic, digital and virtual libraries.

1.1 Objective of the Study

To review and define what electronic, digital and virtual libraries are and consider:

- i. their features and functionalities
- ii. their distinctive differences
- iii. their types and whether they are locally or abroad based.
- iv. their advantages and disadvantages

1.2 Statement of the Problem

It does appear that these three terms: 'electronic library', 'digital library' and 'virtual library' are often confusing to both librarians and library users. It is most likely that greater percentage of our professional colleagues are either completely ignorant of the differences of the terms or may be unable to confidently explain them when confronted with the question of differentiating them. The nagging questions are: (a) Do these terms convey the same meaning? (b) Are there differences among them? (c) Is there any similarities between them? (d) Is it one type of library described in three terminologies? The problem is that these questions, simple as they may look, have posed serious challenge even to some senior colleagues in the LIS profession, as well as young librarians. It becomes necessary therefore, to x-ray these terms by reviewing literature in order to identify and elucidate the differences for fuller understanding and proper application of the terms in their library and information services.

1.3 Concept Definitions and Clarifications

At first instance, it would appear as if the three types of online libraries (electronic, digital and virtual) are synonyms. Poulter

(1993) was of this view when he defined one of them and said it is also referred the other two. According to him, virtual library is a user-accessible network of computer-based information resources, also referred to as digital libraries or electronic libraries. Though they are closely related, there are identifiable differences, however.

In comparing virtual library with digital library Reitz (2004:760) states that "the term digital library is more appropriate because the term virtual (borrowed from 'virtual reality' suggests that the experience of using such a library is not the same as the "real" thing when in fact the experience of reading or viewing a document on a computer screen may be qualitatively different from reading the same publication in print, but the information content is the same regardless of format." According to Asiru (2008), an electronic library or digital library can either be virtual, or confined within a building. When an electronic or digital library is not restricted to any building, it is said to be a virtual library. Thus, it is not a "real life" library as it is known in the traditional way. Some refer to it as "library without walls".

2.0 Literature Review

2.1 Electronic Library

Electronic library, or simply *e-library* consists of electronic materials and services such as video tapes and CD-ROMs". Aina (2004) defines electronic library as a library that consists of materials and services in electronic format rather than print format. This implies that digital materials like electronic database, CD-ROMs, video and audio tapes, microforms, among others that require the use of electricity come under electronic libraries.

The term "electronic library" is also defined by The National Diet Library, (1998) as "the provision by a library of primary information (actual materials) and secondary

information (information about the materials) electronically, via communications networks, together with the infrastructure for this purpose." The electronic library provides electronic publications on-line, and will also digitize and make available materials that are presently held in print form.

The electronic library is an expansion of traditional library services utilizing new information technologies. It makes a wealth of information accessible, and enables regional or other disparities in information access to be corrected. It acts as a guide to the vast expanse of cyberspace, allowing anyone, anywhere to access information at any time.

2.2 Examples of Electronic Library (Resources)

Any library or information resources that can be accessed electronically, e.g.

- electronic journals
- scholarly databases
- electronic books
- hybrid digital collections
- Internet gateways and search engines

The resources can be free or fee-based access for users.

2.3 Advantages of Electronic Library

Electronic library leads to expansion and development of library services in the following ways:

- Correcting regional or other disparities in information access;
- Enabling integrated access to many types of information;
- Realizing a variety of functions which utilize information and communications technologies;
- Enabling economic and efficient access to information.

2.4 Terms to know when using Electronic Library

Database: Collection or file of electronically

stored data or unit records with software for the retrieval and manipulation of the data.

Downloading transaction: Any procedure that aims to reproduce electronic data onto a local storage medium or printing facility.

Electronic Library Resources: Every document in electronic form which needs special equipment to be used.

Electronic Library Services: Services which are either supplied from local servers or accessible via networks.

3.0 Digital Libraries

A digital library according to Reitz (2004) is a library in which a significant proportion of the resources are available in machine-readable format, accessible by means of computers. The digital content may be locally held or accessed remotely via computer networks. In libraries, the process of digitization began with the catalogue, moved to periodical indexes and abstracting services, then to periodicals and large reference works and finally to book publishing.

More so, Ashok (2008) defines digital library as a heterogeneous collection of network – based repositories using a variety of protocols for user interaction, data encoding and transmission. It is a logical extension of the networked environment and the development triggered thereof and provides the user with coherent access to a very rare, organized repository of information and knowledge.

Digital library concept has emerged as an established phenomenon in the recent past, and is getting deeply rooted in the field of Library and Information Science. The digital libraries aim is to provide ready access to the storehouse of information, which will be shared together with the other consortia-based libraries. Digital libraries are combined communication technology and information source, which allow remote access of its resources to other consortia based libraries through the national and international level

networks.

Viewing from the perspective of systems and operations involved, Tiwari (2011) asserts that digital libraries deal mainly with digital materials and services. The items in digital

libraries are stored and processed using digital devices. Their transmission is over networks. Table 1 shows a few examples of digital libraries based in Nigeria and overseas.

Table 1: Examples of Digital Libraries based in Nigeria & Overseas

Nigerian-based Digital Libraries	Oversea-based Digital Libraries
1. Festus Nwako Library UNIZIK Awka 2. MTN Library UNN. 3. Federal College of Education (Technical) Umunze Library. 4. President Obasanjo Library Otta, Abeokuta. 5. UNILAG Library	1. Greenstone Digital library 2. New Zealand digital library project 3. Peking University Digital Library 4. Digitale Bibliothek Information und Medien Germany 5. Kids’ digital Library United Kingdom

Table 1: Examples of Digital Libraries in Nigeria and Overseas

3.1 Features of a Digital Library

A digital library consists of organized collection of multimedia and other types of resources.

- Resources are available in computer process-able form.
- The functions of acquisition, storage, preservation, and retrieval are carried out through the use of digital technology.
- Access to the entire collection is globally available directly or indirectly across a network.
- Supports users in dealing with information objects.
- Helps in the organization and presentation of the above objects through electronic/digital means.

In order to have a better understanding of the term “digital library”, the following elements need to be considered:

1. The digital library is not a single entity.
2. The digital library requires technology to link the resources.
3. Universal access to digital libraries and information service is a goal.

4. Digital library collections are not limited to be a document replacement, rather, they extend to be digital view that cannot be represented or distributed in printed formats.

3.2 Advantages of Digital Library

Digital library has numerous advantages as enumerated by Neal and Sloane (1999) and cited by Aina (2004). Among these are: Accessibility, availability, searchability, researchability, integration, of text, image, sound and video, unlimited capacity of the computer to store a large amount of information, up-to-date and relevant information; wealth of simple information of direct applicability to every subject; many users can access information simultaneously from single electronic site from many locations, and copies of information can be delivered with electronic speed.

It is easy and simple to preserve and conserve digital materials. An exact copy of the original can be made any number of times without any degradation in quality. Again, traditional libraries are constrained by storage space but digital libraries have the potential to store much more information because digital

information requires very little space to contain them. When the library has no space left, digitization is the only way out.

4.0 Virtual Libraries

A virtual library is defined by Reitz (2004) as “Library without walls” in which the collections do not exist on paper, microform, or other tangible form at a physical location but are electronically accessible in digital format via computer networks. According to her, such libraries exist only on a very limited scale, but in most traditional print-based libraries in the United States, catalogues and periodical indexes are available online, and some periodicals and reference works are often available in electronic full-text. Some libraries and library systems call themselves “virtual” because they offer online services. Colorado Virtual Library at www.aclin.org is an instance.

A virtual library can be described as “an information service or resource which a user accesses via telecommunications network and which may be an amalgam of services and resources housed in a number of different locations” (Aina, 2004). The term “virtual library” was coined by Nancy Schiller who defined it in 1992 as “libraries in which computer and telecommunication technologies make a wide range of information resources possible”. Ajibola (2007) describes a virtual library as a repository of knowledge which has no physical existence but exists electronically. Implicit from this definition is that materials are not physically stored as books or tangible media as in traditional physical collections in a library building. Virtual library consists of a collection of textual, graphical, audio and visual components which may be of intellectual benefits to its users. Access to a virtual library is not constrained by time or geographic location (Gbadamosi, 2008).

The resources that could be found in a virtual library are computer files, graphic

files, electronic mailing lists, discussion groups, bulletin boards and telnet which allows connection to a remote computer via the internet. In essence, virtual library comprises electronic library, telecommunication and computer terminal of the user (Asiru 2008). Information can be accessed by users anytime regardless of distance through virtual library.

4.1 Features of Virtual Library

One basic feature of virtual library is that it emphasizes access to collections which are held on the belief that the whole global information superhighway is a human resource and heritage which all who have the necessary infrastructural capabilities can tap for their own development. Virtual library is therefore regarded as a child of necessity arising from the need to use technologies in accessing world of information overload for human survival and development. Gbadamosi (2008).

Furthermore, Aina, Mutula and Tiamuyu (2008) note that virtual libraries are characterized by the following features:

- they provide remote access to information over network;
- they exist as a virtual, i.e. not as physical entity;
- they give the illusion of access to much large collection of information than actually present through connections to other libraries;
- they facilitate immediate and simultaneous access to information;
- they are distributive because, they can be accessed from anywhere anytime subject to restrictions that may be imposed by standards, firewalls, and other infrastructure;
- they are interactive, and supports 2-way communication with the users;
- their content is separable from media (unlike print documents); and

they exist as multimedia objects in the form of text, video, sound, graphics and animations.

4.2 Advantages of the Virtual Library

Networking: The virtual library provides an avenue for sharing knowledge and other sources of information. It can provide a forum for interchanging ideas from institutions or colleges with rich resource to institutions or colleges with poor resources and vice versa. Consequently, all participating colleges will share information through global network of virtual libraries.

There is no physical boundary: The user of a virtual library does not need to be physically present in the library. People all over the world can gain access to same information, as long as there is available working internet connection.

Non-stop availability: The virtual library is available round the clock. It is accessible anytime, any day and anywhere, 24hrs a day, and 365 days round the year.

There is **multiple access** in the virtual library as the same resources can be used concurrently by a number of users.

The virtual library **creates room for structured approach**, that is, it provides access to much richer content in a more structured manner, users can easily move from the catalogue to the particular book and then to a particular chapter.

The virtual library **creates user friendly interfaces**, giving clickable access to its resources. One can research using any search term such as word, phrase, title, name or subject to search the entire collection.

Low cost: The cost of maintaining a virtual library once it is set up, is much lower than that of traditional library. A traditional library must spend large sums of money paying the staff, purchasing and maintaining books, all of which virtual libraries do away with.

4.3 Distinctive Differences between electronic, Digital and Virtual Libraries

In order to distinguish electronic, digital and virtual libraries, it is pertinent to consider their formats, collections and access to their resources. Aina, Mutula and Tiamiyu (2008) have described the three concepts as follows:

Electronic Library – the core library processes of acquisition, cataloguing, online access, circulation, and information retrieval are computerized. However, the information resources need not be in digital formats. Users have access to librarians but attempts are made to minimize such contact. This type of library by and large also occupies physical space.

Digital Library – may be perceived as an information service or a collection of electronic information resources, in which all the information resources are available in computer processable form. In addition, the functions of acquisition, storage, preservation, retrieval, etc., are carried out using digital technologies such as computers, networks, etc. A digital library contains no conventional printed information resources, but electronic books, journals, and newspapers. Access to the librarians may also be through electronic means such as email. The library may or may not occupy a physical space, where users need to go to gain access to its electronic resources.

Virtual Library – refers to an information service or collection of electronic resources whose collections are entirely in virtual or digital form and information is accessed over a network. Such library provides access to virtual indexes, catalogues, and books. Virtual library does not have physical space, where users visit to access information resources. Instead, access is distributed and virtual. It is sometimes referred to as 'paperless library', 'library without walls', 'networked library', 'seamless library' and library of the future.

5.1 Disadvantages of Digital Library

Writing about disadvantages of digital libraries SSCASR (2011) notes that the computer viruses, lack of standardization for digitized information, quick degrading properties of digitized material, different

display standard of digital product and its associated problem, health hazard nature of the radiation from monitor etc. make digital libraries at times handicap. The areas in which digital libraries are disadvantageous are enumerated and briefly explained in Table 2.

Table 2: Disadvantages of Digital Library

N/S	Area of Disadvantage	Explanation
1.	Copyright	Digitization violates the copy right law as the thought content of one author can be freely transfer by other without his acknowledgement. So One difficulty to overcome for digital libraries is the way to distribute information. How does a digital library distribute information at will while protecting the copyright of the author?
2.	Speed of Access	As more and more computer are connected to the Internet its speed of access reasonably decreasing. If new technology will not evolve to solve the problem then in near future Internet will be full of error messages.
3.	Initial cost is high	The infrastructure cost of digital library i.e. the cost of hardware, software; leasing communication circuit is generally very high.
4.	Band width	Digital library will need high band for transfer of multimedia resources but the band width is decreasing day by day due to its over utilization.
5.	Efficiency	With the much larger volume of digital information, finding the right material for a specific task becomes increasingly difficult.
6.	Environment	Digital libraries cannot reproduce the environment of a traditional library. Many people also find reading printed material to be easier than reading material on a computer screen.
7.	Preservation	Due to technological developments, a digital library can rapidly become out-of-date and its data may become inaccessible.

5.2 Disadvantages of Virtual Library

There are some disadvantages or concerns that need attention and consideration when creating a virtual library. Grantham (2007) and A Kaleidoscopic World (2008) identified the following as disadvantages of virtual library:

1. Restricted by copyright law.

Works cannot be shared over different periods of time like a traditional library content is public domain or self generated

If copyright exists permission should be

requested

2. Requires connectivity

Instability of Internet sites requires regular checks should be carried out to ensure that web links are still active

If there is not Internet connection, the virtual library is inaccessible

Many people do not have Internet access – the Digital Divide may apply

May have access to the Internet but lack skill to utilize the available information

3. Skilled professionals are required to organize, maintain and help students guide students in their selection, evaluation and use of electronic choices

need the knowledge of Boolean searching and advanced searching skills

4. Increased number of resources challenges student selection

Purchase of online materials are not tailored for a particular community of learners

Increased need for instruction in use and evaluation of resources

Students face difficulty in selecting quality material from the increased assortment of resources.

Conclusion

The libraries under review are all associated with of computers and the Internet. From the foregoing, the difference between these libraries may not be very significant as they talked about digital and electronic formats. Nevertheless the following could be observed as the slim difference between them. Electronic library is the same thing as digital library but might include analogue data formats like laser discs etc which could require electronic gadgets to use them.

Digital library is a repository of information in digital form, i.e. stored as data files on a computer. It is also the tool-set provided to enable search and retrieval of the repository. Virtual library is a collection of resources available on one or more computer systems, where a single interface or entry point to the collections is provided. The key point being that the user need not know where particular resources are located. The location is 'virtual'.

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