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Library Philosophy and Practice (e-journal)

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2-25-2020

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ejiroghene, Eniekebi, "PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS IN THE DIGITAL AGE: CHALLENGES FOR LIBRARIES IN NIGERIA." (2020). *Library Philosophy and Practice (e-journal)*. 5090.

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# **PRESERVATION AND CONSERVATION OF LIBRARY MATERIALS IN THE DIGITAL AGE: CHALLENGES FOR LIBRARIES IN NIGERIA.**

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## **ABSTRACT**

*The paper aims to clarify preservation and restoration as steps to ensure reuse of library resources in their original format for as long as possible. To this end, the causes of the deterioration of library materials such as poor paper quality, inadequate storage, rough handling, pests and knowledge of the incidence of a disaster, electronic means of preservation, challenges and strategies for preserving digital materials have been investigated and recommended, inter alia, that federal, state, local, private and multinational companies*

**Key Words:** Preservation, conservation, library materials, digital age, digital materials

## **INTRODUCTION**

Libraries play a critical role in organizing, preserving and providing access to the information resources of the society. The library's diverse components such as books, serials, audiovisual items, houses, furniture and fittings, library staff and users support each other in making service delivery a reality. The library will be well equipped for providing services when all of these components are available. However, current developments in science and technology, the evolution of information communication technology and the subsequent interest of library patrons in accessing information resources anywhere and at all times have made it inevitable to consider the alternative option of reaching out to library users. Since the library's ultimate aim is to provide service to users in specific, acceptable format and in a timely manner, it has become important to implement digital technology for the creation, delivery, and storage of library resources in order to meet users' information needs and behaviours. Digital library resource preservation can enhance timely access to information, improve knowledge discovery, provide unrestricted access to information and help minimize the burden on users when they have to physically visit the library's location to access the information services needed.

The concept preservation, in this paper, is used to refer to all necessary strategies, measures, and steps invested into prolonging the lives of library information resources. As supported by Lasisi (1999), preservation is used to denote all those activities and measures intended at conserving library materials for posterity. Murray (2005) explained that preservation is an indirect method of treatment in which the environment around an item is changed. This includes stabilizing, maintaining and monitoring temperature, humidity, light exposure, air pollution, dirt, dust, and

mold.

Preservation also involves surveying the correct storage and handling procedures, protection including theft, vandalism, disaster prevention, awareness, training, and outreach programs for employees, employers, customers, and the public, while preservation is a direct care process in which an object is modified physically or chemically. This includes to clean, patch, rebind, and reformat. All treatments for conservation involve the least intrusive methods possible and the use of acid-neutral materials. Alegbeleye (2002) on the other hand, clearly states that there are few misconceptions about the use of preservation and conservation. He explains that the terms preservation and conservation are used interchangeably. But experts in the field strictly speaking draw a distinction between the two terms. Preservation covers both administrative and financial aspects, including arrangements for storage and housing, staffing rates, regulations, procedures and methods involved in preserving library and archival resources, and the information found within. Conservation, on the other hand, refers to specific practices taken to slow deterioration and prolong the life of an object by directly intervening in its physical or chemical makeup.

Definitions of the latter involve fixing damaged books, binding paper or de-acidifying paper. From the above definition, one would deduce that preservation of library materials applies to the activities related to maintaining library materials for use, either in their original physical format or in some other form. This includes a number of procedures from the control of the environment to conservation treatment.

Conservation, therefore, is the treatment of library materials to stabilize their physical structure in order to sustain their survival as long as possible in their original format. At a higher level, preservation connotes far more than keeping a material in its original form or being familiar with all reformatting technologies available. It also means accessibility; when a user needs it, he gets it. Therefore, the entire method of protection, shelving, shelf-reading, and circulation are in fact techniques of preservation. Preservation of items from crimes such as mutilation, defacing, or theft are preservation tenets. This is done to ensure the longevity of library resources during their lifespan. According to Hornby (1976), preservation implies the state of being or remaining in a stated condition after a long time while conservation refers to the controlled use of a limited supply of materials to prevent waste or loss so as to facilitate its use in the future. According to Digital Preservation Coalition (DPC 2002), the term 'preservation' is an umbrella word or concept under which most librarians and archivists cluster all the policies and options for the managing, including conservation treatments of different formats of information material. Consequently, digital material preservation is a method of preserving information materials that refers to digital surrogates produced as a result of transforming analog materials into digital form (digitization), as well as those that are "born digital" for which analog counterpart and digital records never existed, and are never intended to be.

## **THE CONCEPT OF DIGITAL PRESERVATION**

According to the Yale University Library Digital Preservation Policy (1999), digital preservation is used to mean all activities and processes involved in the physical and intellectual security and technological stabilization of digital resources over time to replicate accurate copies of those

resources. Essentially, all of the operations and procedures are aimed at reproducing authentic copies of those tools. Digital resource preservation decisions are focused on library strategy, strategic plan, digital resource management interest, and digital resource preservation viability. The need to preserve the digital resource may be made at the time the resources are created, acquired, or licensed. In addition, the collections, curators, and bibliographers must determine the preservation criteria for the digital resources in consultation with technical experts. Digital resource protection can involve any required measures to preserve continued access to digital content, ensure its accuracy, and mitigate or reverse the effects of obsolescence and media hardware and software. Decay Issues such as continued exposure, the quality of digital resources, and ensuring hardware and software currency are of utmost importance for digital resource preservations. According to Ominyi (2003), digital library is the transfer of a document's material from a print copy to an electronic computer. In other words, the print documents are transferred to the electronic computer and then viewed through the same network. Similarly, Bridge (2003) notes that the digital library takes conventional library materials in the form of books and papers and transforms them into electronic form where a computer can store and control them. Fatoki (2005) further clarified that digitisation is the transformation of analog media into digital form. While Akintunde (2007) described digitization as a process of converting a piece of information into bits, such as sound recording, image, or video. The digital preservation of library materials is more than just moving library resources from print or analog resources to digital format. It involves digital resource management, searching for relevant material, transforming digital content into a navigable format to improve access, retention, and successful distribution of digital content to target audiences.

Achebe(2008) has described digitations as the process of converting a piece of information into bits from books, sound recordings, photographs, or video. In a computer system, bits are the fundamental units of information. Digital library according to Okoro(2008) is a library in which a substantial portion of its resources are accessible through computer specific steps in library resource digitization, including: preservation of the physical library catalog and provision of the electron edition, arrangement and preservation of periodicals and reference works in large quantities and quality as a prelude to the establishment of the library. Collections of digital libraries may come from existing print materials Mutula and Ojedokum (2008) (created digitally or through digitization process). According to Reitz (2004), digital libraries allow the seamless incorporation of scholarly electronic material, help to build and preserve local content, and improve the processes and capabilities of the library's information systems and services. They increase the portability, performance and access, versatility, availability and digital object preservation.

Digitizing according to the Digitization Guideline Initiatives of the Federal Agencies (2009) is creating digital artifacts and applying digital resources to distribution systems and repository environment, as well as reviewing and improving the digitization effort. Reiterating that digitization processes may involve the following phases: Project planning: processes occurring prior to digitization, digital conversion, and post-digitization.

## **NATURE OF LIBRARY MATERIALS**

Library materials are in a wide variety of sizes, shapes, and formats which often present problems in relation to library storage and access procedures. Some of the materials like television sets, cassettes, cartridges, film recording, computers etc can prove heavy and cumbersome for handling, while others like slides, filmstrips and multi-media kits can prove very difficult to organize, shelve and control. Media records quite often have standards laid down that are associated with storage and control. Enright (1972) stated that playing a videotape removes minute layers of the original, and a librarian concerned with media records has to be aware of the point at which the technical condition of an item will militate against its effective use. It is necessary to mention that many media materials are more vulnerable to careless treatment and abuses than books. The annoyance and frustration caused to users and audience by providing damaged or defective materials can dent the reputation of a library and deflect a user's confidence in its services. And, this can be very monumental indeed.

## **CAUSES OF DETERIORATION OF LIBRARY MATERIALS**

Materials deteriorate as a result of:

- (i) Internal or inherent vices and
  - (ii) External agents of deterioration
- 
- i. Internal or inherent vices are caused by weakness in the chemical or physical make-up of an object introduced during its manufacture. Earlier paper was made of clean lines, flax, cotton, and solid fibres. It was not handled with bleaching agents, nor was it scaled with alum and rosin. This type of paper was permanent, resilient, and was strong enough chemically and physically to withstand the wear and tear of the ages. Modern paper (paper produced since the 19th century) has wood pulp as its basic raw materials instead of cotton and line rages. The wood pulp is bleached with chlorine and the paper sized with alum and rosin. This makes the paper acidic thereby placing the paper in a low PH condition Ph is a symbol used to signify the degree of acidity or alkalinity of any organic material.
  - ii. The external agents can be classified as:
    - a. Biological causes
    - b. Environmental causes
    - c. Chemical causes
    - d. Mechanical causes

**Biological Causes:** Mold, mildew can cause serious, often irreparable damage to paper materials. The most common species affecting library and archives materials are silverfish, bookworms, booklice, and cockroaches. Most insects are not attracted to the paper, but rather to sizing, adhesives and starches that are dark, wet, dirty, clustered and undisturbed. Mold and mildew are types of fungi, microorganisms that depend on other organisms for sustenance. Molds excrete enzymes that enable organic materials such as paper and book bindings to be digested, altering and weakening those materials. Harvey (1993) suggested that a clean, well-ventilated and climate-controlled environment goes a long way toward preventing infestation by

any of these pests.

**Environmental Causes:** Researches indicate that cooler temperatures are preferred for library materials. According to the Library of Congress preservation recommendations, an ideal environment for books is 55°F storage areas. Mixed-use storage areas should be kept at 70°F. If library materials are stored separately from use areas, the temperature can be brought down further to 65°F or less. Uncontrolled humidity levels can cause mechanical damage. If conditions are too humid, the material will swell and warp, resulting in cockling and other physical distortions. These dimensional changes weaken physical bonds and set up stresses that can shorten the life of most materials. If conditions are too dry, materials will become brittle and more susceptible to cracking, particularly during handling. Light is very vital in the provision of library services since materials have to be identified and read. On the other hand, it is one of the greatest enemies of library materials, especially paper. Evans (1995) explained that non-print materials are particularly sensitive to the effects of ultraviolet light, so videotapes and microforms should never be shelved near a window.

**Chemical causes:** Airborne contaminants in the form of gases and particulates can jeopardize the preservation of library materials. Gaseous pollutants can originate indoors from photocopiers, painting, cleaning supplies, untreated wood and certain kinds of adhesives and plastics. Particulate pollution is also a great concern. Particulates come in the form of tiny solid substance from smoke, dust and vehicle engines. The library should be fully air-conditioned, air conditioners are highly recommended for books. Air conditioners help in stabilizing the temperature and humidity for libraries. They also help to filter out particulates and chemical pollutants.

**Mechanical causes:** Mechanical damage to library materials includes the human factor and natural disaster. Alegbeleye (1993) argues that archives and libraries are vulnerable to disasters that can be narrowly categorized as man-made and natural. Natural material damage can be caused by earthquakes, fire, floods or water, while the human factors include poor handling, vandalism and inadequate storage support.

## **THE NEED FOR PRESERVATION AND CONSERVATION**

The loss of library materials is the central concern in libraries and has given rise to the needs for restoration and conservation. In the course of preserving materials, there is need to adequately consider the value of records in terms of its educational, socio-political and economic impact on society, and decide the period during which each class of documents might be kept for use and then destroyed or permanently preserved for future use. And there is no infinite library stuff. Through their very nature, they are vulnerable to decay, and therefore they are ultra-important to protect and conserve. To protect the information found in all communication media for successful use by future generations, all operations on them need to be preserved, conserved, or affected. There is a need to preserve titles which have are-actual, biographical or intellectual values. It is instructive to note that paper, for instance, deteriorates very fast because of their ephemeral nature. The paper produced by the machine is made of wood, a pulp containing harmful acids which cause it to deteriorate quickly. The binding materials also contain harmful

ingredients which cause deterioration. Environmental factors such as high temperature and relative humidity, exposure to light, air pollution, and careless handling by growing number of users in open access repositories cause materials that are very useful to deteriorate and harm to item. Three main factors are important in the process of making decisions regarding preservation and conservation. They are:

- i. **The building:** To identify potential hazard arising from security, fire, flood, and other natural disasters.
- ii. **The interior building:** Including reading and storage areas, to assess the environmental conditions and the physical state of shelving units, taking measurements of lighting levels, temperature, and humidity, and assessing levels of dust and atmospheric pollution, and
- iii. **The collection:** To identify the scale of damage to paper including assessment of paper embitterment, damage due to mold or insect and damage to bindings, etc.

### **ELECTRONIC MEANS OF PRESERVATION**

For some decades now, there has been a revolution in information storage media. Data is now stored electronically in digitized formats. Computers are presently very basic to library functions and services. Mostly, they act as gateways in libraries and information can only be accessed, nay retrieved through them. Physical materials are of lesser interest to the end-users in an environment where information is electronically accessible. The storage issue is removed from the point of use (where it has historically been located) to the point of supply, and basically that of preserving information. The information producer bothers about the location of extensive databases for storage and preservation from where users can access whatever they needed. According to Feather (1996), there has been exponential growth in the creation, use, and significance of electronic data and there has been great diversification of its sources of origin. Until around 1990, librarians had no need to think around maintaining electronic records, they were only interested in ways to hold production media such as audio CDs and CD-ROMs in a usable state for a long period.

This mindset has changed the idea and the creation of the electronic library. This is not surprising because automation brings with it a lot of dynamism and we must try to keep pace with the changes. In situations where the preservation responsibilities rest absolutely on the information producer, the librarian or information provider, who is the interface between the producer and the end – user, need only to contend with making his output media survive in usable condition for at least the period when updated versions of the output would be produced. Then, the librarian subscribes to the latest versions of the output media. The problem of long-term survival stays with the data producer, of course, this can only be appropriate in a network environment. Digitization as a tool for the preservation of information originally created in conventional formats, especially newspapers, has been canvassed widely in recent years Feather (1996). Conversion to a digital format gives the user a whole range of new search tools since what is created is a file that is flexible and can be manipulated just like any other electronic data file. Digitization is an expensive option for preservation though legitimately viable.

## **CHALLENGES OF DIGITAL MATERIAL PRESERVATION**

Challenges of preserving or archiving digital information are not new and have been explored in many forms over the last five decades. Several scholars and institutions, respectively, such as Garret and Walter (1996), Lin, Ramah, and Wal (2003), Caplan (2004), Wamukoya and Mutual (2005) and the national library of Australia (2003), have cited the following challenges to the preservation of digital materials:

- Technological obsolescence;
- Continuous migration;
- Lack of legislation, policy, and strategy
- Lack of awareness
- Lack of collaboration and partnership;
- Deterioration of the digital media
- Disaster planning and recovery

Each of these challenges faced in preserving digital materials is briefly discussed below:

### **Technological Obsolescence:**

Markets are full of a variety of digital formats that continually change from time to time with some formats getting obsolete (Caplan, 2004). Format obsolescence is complemented by rapid hardware and software obsolescence, which is a significant threat to digital preservation, as it causes the loss of the means of access (Wamukoya & Mutual, 2005). This comes as a result of the continuous upgrade of operating systems, programming languages, applications and storage media (Lin, Ramiah & Wal, 2003). Such loss of access makes preservation of digital materials meaningless since the main purpose of preserving digital materials is to maintain accessibility. Continuous Migration Another challenge of digital preservation, which arises from the challenge of rapid technological obsolescence, is the need for continuous migration.

### **Continuous Migration**

Migration is a way to resolve technical obsolescence by moving digital capital from one generation of hardware / software to another. The aim of migration is to maintain digital objects 'intellectual content and to retain clients' ability to download, view, and otherwise use them in the face of ever-changing technology (National Library of Australia, 2003).

### **Lack of Legislation, Policy, and Strategy**

According to the National Library of Australia (2003), lack of supportive legislation is a major challenge of preservation of digital materials. Besides, since legislators are usually neither aware nor conversant with the requirements of digital preservation, they make legislation that either ignores or inadequately cover digital preservation issues (Wamukoya & Mutual, 2005), further, internet links bring additional challenge in terms of copyright legislation in that the copyright of software required to access digital files, and the right to copy for preservation has not been adequately articulated in most national legislation. For instance, the current practice is that due to copyright requirements, a subscriber to an Internet-based information service requires to



continuously renew the access license, even for materials long paid for, in order to continue accessing the same information. An additional challenge is that digital transformation was too rapid and costly to implement timely and knowledgeable preservation strategies for governments and institutions.

### **Lack of Awareness about Digital Material Preservation**

The UNESCO draft charter on the preservation of digital heritage stresses the need for urgent awareness raising and advocacy in favor of the preservation of digital materials. It proposes for the alerting of policymakers and sensitizing the public to both the potential of the digital media and the practicalities of digital preservation.

### **Lack of Collaboration and Partnership**

Another major challenge of digital preservation is lack of collaboration and partnership among stakeholders, as well as "Lack of clearly assigned responsibilities and resources for the long-term preservation" of digital materials (Wamukoya & Mutual, 2005). Such absence of collaboration and partnership exists among governments, creators, publishers, relevant industries and heritage institutions. There is also need for partnerships between archivists, information technology personnel, systems analysts, records managers and other information management staff to come up with holistic strategies on how to deal with digital preservation issues (Lin, Ramiah, and Wal, 2003).

### **Deterioration of the Digital Media**

One of the challenges of digital preservation is the deterioration of the digital media. This is becoming a cause for the disappearance or inaccessibility of digital information (Lin, Ramiah and Wal, 2003), as the media usually deteriorate within a few years or decades at most. Another challenge to digital preservation is the possibility of digital media getting lost in the event of disasters such as fire, flood, equipment failure, or virus attack.

### **Disaster Planning and Recovery**

The other challenge relates to lack of disaster planning and mitigation strategies for digital materials at institutional, as well as national levels. The effect of the absence of disaster planning and mitigatory measures results in unnecessary and sometimes, permanent loss of valuable information resources.

### **Strategies for Digital Materials Preservation**

Russell, (1999) has identified some of the strategies or methods that could be adopted to help preserve digital materials. These strategies are briefly presented below.

#### **Reliance on Hard Copy Media**

This strategy is also known as "change media" involves printing out digital materials and preserving the hard copy.

#### **Technology Preservation**

This involves preserving the technology that was used to create the digital material, including hardware and software. This strategy ensures access to the digital material.

#### **Technology Emulation**

This involves using the existing technology that is able to mimic the old technology, thereby creating the original technical environment for the preserved item to be read or viewed.

## **Migration**

Whereas technological preservation and technology emulation focus on the environment of the object and preserving the resource through re-creating or preserving necessary operating environment a different strategy for digital preservation is what has been called “migration”. Migration is a means to overcome technological obsolescence by passing digital resources from one generation of hardware / software to the next.

## **Encapsulation**

The other preservation strategy is encapsulation which involves the grouping together of resources and whatever is necessary to maintain access to it. This can include metadata, software viewers, and discrete files forming the digital resource (Haag, 2002). He further says that in contrast to the migration approach, the encapsulation approach retains the record in its original form, but encapsulates it with a set of instruction on how the original should be interpreted. Encapsulation is seen as a central component of emulation.

## **DIGITALIZATION SOLUTIONS TO THE CHALLENGES**

Library resource digitization is a project that needs to be tackled with great commitment considering the strong focus on the value of information and the need to make it available to users in the right way and in the most suitable time.

- i. Adequate funding for digital projects should be earmarked, keeping in mind the fact that libraries are working in an extreme information age where information resources are highly valued.
- ii. Infrastructure facilities should be provided in such a way that the environment can easily carry out digitization projects.
- iii. Basic policy enforcement should be placed in place to guide, direct and secure digital intellectual property in line with what is obtainable globally.
- iv. Manpower preparation and development should be improved so digital initiatives can be implemented, tracked and sustained.
- v. Efforts should be made to promote and build local content so that maximum benefits can be gained and help to represent our rich cultural heritage and thus contribute to the global base of culture and knowledge.

## **CONCLUSION**

Materials are the heart of libraries. They are vital to access to learning and information, and in the future sustain knowledge and allow interpretation of the past. Every library, large or small should have a well-defined programme for preserving the materials which it houses. In planning for preventive preservation, users and staff should be aware of their roles in the preservation programme. S.R. Ranganathan in one of his five law of library science postulates that "books are for use". If the materials are not well kept, they cannot provide that function because the most effective way to establish longevity of books/ materials is to prevent or retard deterioration. It is no gainsaying that information is as old as the age of humanity; hence it is highly vital that information sources should be adequately preserved and conserved for all spheres of human development- intellectual, political, social, cultural development, etc, and for posterity. Having

seen preservation and conservation in a pervasive sense and having observed the need for policies to be designed in order to maintain a reasonable level of standardization that will compare with what is obtainable universally, it is imperative to mention that in preserving media materials/ records, it is important to keep them under conducive conditions devoid of dust. It should be ensured that they are properly cleaned and taken care of. Dust can inflict a lot of damages on any media. Elaturoti (1982) stated that media materials should be prevented from water which can soak books and other printed materials. It can also cause audio-visual equipment to corrode. Insecticides should be used with caution as they can cause damage to non-book materials. Due to limited resources and the state of preservation in most libraries, it is impossible to keep all documents or recorded materials in their original format or even transfer the intellectual contents to other media for conservation. Selection and priorities are vital. Cooperation is the key to successful preservation initiatives. No one library can preserve everything. Through cooperation, mass treatment techniques such as de-acidification of books and papers are being developed. Cooperative programmes to preserve valid collection on microfilm have been successful in North America and Europe. Today, countries are working together to preserve documentary heritage through such efforts as the European Register of Microfilm Masters (EROMM) and increased bibliographic control assisted by the internet. Indeed, optical digital technologies, preserving and transmitting information electronically offer both solution and real challenges for the preservation of documentary heritage (Feather and Sturges, 1997) Finally, libraries should not only strive to acquire materials but should ensure that the materials acquired are preserved and conserved in a usable condition for generations of users. Libraries should be air-conditioned as its importance to library materials cannot be over-emphasized. Though damage to library materials are sometimes unavoidable, with careful preventive measures, deterioration of the materials may be lessened or prevented as the old adage says “prevention is better than cure”.

## **RECOMMENDATIONS**

Based on the above challenges, this paper advises that policymakers need to participate regularly and effectively in funding library programs at federal, state, local government, private and multinational corporations.

- i. Basic infrastructure should be provided so as to provide basic facilities to implement digital projects in the country.
- ii. Regulation and legal framework should be put in place to provide policies for digital intellectual properties, and this should be in line with global best practices to avoid the clash of interest at all levels of operation.
- iii. Universities, polytechnics, and training centers should be used for long, medium and short terms measures for development and training of manpower in the area of ICT and its application to library services operations with particular emphasis on digital preservation of library materials.
- iv. Governments at all levels should exercise political will by vigorously pursuing, monitoring and implementing ICT policies that will make computers and internet

facilities available and affordable.

Projects like a computer for all and the establishment of cyber café centers with simple technologies will go a long way in addressing these challenges. Projects that will make the provision of information available at all levels is worth pursuing because we live in an information-intense society where information is valued as other valuable resources such as gold and oil.

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