Web technology in developing countries: The pathway for academic libraries in Nigeria

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Abstract
This paper surveyed the impact of Web developmental stages on academic libraries in Nigeria. Literature regarding technological advancements in Web developmental stages with the associated innovations in library services were collected and utilized for the paper. The literature was provided a baseline data for the paper. Library services which could leverage on information communication technology (ICT) were identified. The paper highlighted the technological innovations and tools associated with each Web developmental stage and outlined how these could be adopted and integrated into the mainstream of library operations in-order to ensure improved service delivery especially in academic libraries. It concluded that technology has proven to be the future of information management and dissemination. It, therefore, urged librarians/libraries to embrace technologies and move with the trend in the information industry. The paper recommended the incorporation of computer science in library schools to train librarians who are ICT-competent to drive the course of ICT-compliant libraries.

Keywords: Academic library, Web development, technology, librarians, Nigeria

Introduction
Libraries have been a major entry points for emerging technologies, and this has consistently expanded the scope of managing and discharging information services to its broader clientele. Hence, as users become more demanding amidst political, cultural, social, and economic changes in their interactions with information, librarians have found themselves in professional bewilderment on a wide proportion. The society today, has started to recognize librarians, not just as books and knowledge curators, but also managers of information resources and of the user, in particular, in the face of the constant transformation of library services from one phase to another in the attempt to provide user-oriented information services. Thus, since the primary aim of academic libraries (to collect, store, preserve, provide information services to support teaching, learning, and research) remains the same, the transformation of library services, orchestrated by factors such as information needs, seeking behaviour, technology, philosophy of a society among others, has equally led to changes in terms of availability of specific, measurable, accurate and timely information. This has progressively made it challenging for academic libraries to continue to operate efficiently with the traditional methods of acquiring, organizing, processing, managing and disseminating information to support teaching, learning, and research activities. This transformation, therefore, is necessary to accommodate societal changes as regards information needs at every given time.

Web developmental stages
Traditional library services are being restructured and repackaged in view of emerging technologies. These transformations and changes are mostly steered by revolutions in Web development which are reflected in technologies of communication, creation, and content

sharing thus, making it very useful at par with library services. The libraries are expected to incorporate and measure up with the innovative outcomes of Web developmental stages. Each stage of Web development and the associated technologies are improved with features bothering on the functions and activities of the system of knowledge creation, information management and retrieval. The initial Web (1.0) involves browsing contents chiefly characterized with read-only property. Web 2.0 is about uploading contents, a social Web environment where people, organizations, and social entities can add, edit and share information resources; and Web 3.0, according to Bhattacharya (2016), is about developing services that have the capability to merge separate uploads into more elaborated pieces of contents. At this stage, library philosophy has shifted focus from collection-base to client-centered approach in information services, serving as apo-mediators between users and varied information resources (Umeozor, 2020).

Discussions on library services and technology, particularly on Web development, have proposed a hybrid provision of library services which involves engaging Artificial Intelligence (A.I)/robots to render library services. The Web generations have influenced the information seeking habits of library users to varying degrees. This scenario is also changing the mode of operation in information business. Presently, librarians can effectively connect to users in creating contents and information to generate knowledge (Ajala, 2001; Ajidahun, 2010; Star, 2011; Kwanya, Stiwell, and Underwood, 2015). This concept has been discussed and debated extensively in literature until the incidence of COVID-19 pandemic in December, 2019. The global disease caused a total shutdown of most of the world activities. Sequel to this, academic libraries shut their physical doors to users globally. This situation was so critical in developing countries of the world which have very minimal presence of automated library services. Consequent upon this, the authors reasoned that this situation has provided the platform to infuse the preposition of hybrid library activities in line with the Web developmental stages. There has been the belief, a concept that an online library cannot adequately replace the physical library. However, the COVID-19 experience has shown the necessity for, at least, a hybrid library and online information services in academic libraries. Hence, this paper assessed the stages of Web development in parity with possible library and information services in developing countries.

Libraries have always been among the first to adapt and use the latest information-handling tools and communication technologies (Swain, 2015). Libraries provide the gateway to information access and use, thus, in every in every academic institution and other social organizations, libraries are required to keep abreast with changes in the society especially as it concerns individuals, who are the major patrons of services rendered in libraries. Hence, with technologies impacting the processes of information use, librarians are faced with the challenge of acquisition skills (tech-savvy) needed to fit into the trend of techno-administration of information. Consequently, the library profession has been in constant development and service reformation in tandem with technological advances.

Libraries in the 21st century are realizing the need to shift their services from traditional practices to technologically driven platform. Indeed, there is currently being experienced information explosion in great proportion with a tremendous generation and communication of information that is cumbersome to handle,

using traditional methods. Moreover, the experience of the Corona Virus pandemic that shook the world globally provides sufficient reason why libraries should leverage on the adoption of ICT tools and facilities to enhance information service delivery. Libraries can provide technology-driven services such as the provision of access to a variety of information and digital archives from any location, updating users of library activities through SMS, electronic mails and Social Medias (Kumar, 2019). Issa, Ayodele, Abubakar and Aliyu (2011) observed that technology is able to revolutionize library services in a good number of ways including acquisitions, circulation, serials, and user services. This is good news, as technology can be adopted to ensure improvement on various library services. The introduction of information technologies has been able to impact libraries' roles in acquiring, organizing, managing, storing, preserving and disseminating information which in turn is continuously impacting libraries' influence on the society. Some libraries are taking advantages of the internet and other Web technologies to advance the nature of reference services they offer to their users. This is called digital reference services and it serves as a good instance of how technology is transforming the nature of library services (Mwiinga, M'kulama, Chisunka-Mwila, & Daka, 2020). Other notable instances is the transformation of traditional catalogue to the Online Public Access Catalogue which uses Web technologies to enable users access to the library's catalogue electronically and from any location (Fabunmi & Asubiojo, 2013). Also, the development of institutional repository where scholarly materials such as theses and dissertations, images, working papers, published works, preprints, among others are easily transferred digitally using majorly Web technologies (Parvez, 2011).

According to Sahoo and Sharma (2015), the following areas provided an overview on how technology is transforming libraries' services in this 21st century: acquisitions (bookshops are online e.g., Amazon.com, ordering, billing, bibliographic details and downloading of biblographic records etc.), classification (Dewey Online, search engines such as Yahoo use DDC), collection development (subscription to e-books, e-journals, e-databases etc., consortia approach, pay-per-use), cataloguing (cataloguing of network resources, WorldCat (OCLC), WebOPAC, metadata standards dublin core), circulation (remote login, status check, others include reminders to users, resource sharing, union catalogue, access to database over networks), and user education (through email, through social media, through Websites, through blogs).

The ability of users to access a vast sources of information anywhere in the world, the continuous improvement on the value of library services, the ability of users to be attended to round the clock, the advantage of storing a vast amount of information on a small physical space, the advantage of disseminating huge amount of information at high speed regardless of distance and the continuing evolution of the roles and functions of the library are some of the benefits of integrating technology into the library system (Kumar, 2019). Technology, no doubt, has presented the library with unlimited opportunities. Based on the foregoing, technology is one of the most significant responses to Ranganathan fifth law of Librarianship (Library is a growing organism) which cuts across all ages (Adindu & Chinyere, 2015).

The Web/internet has been major precursors of philosophical changes in the library. The first stage in Web development, Web 1.0 birthed the modern-day library, known as library 1.0. However,

communication within the phase was read-only pattern (one-directional). Web 2.0 propagated ICT tools into the information arena, leading to autonomy (read-write-publish) in information handling. Thus, library 2.0 utilizes social media in information services, and is about communication and community, writing and participation, smart, remix, and universality. This also championed the incidence of information overload. Web 3.0 is an intelligent Web designed with tailor-made search, personalized search, and deductive reasoning (Berners-Lee, 2009). Web 3.0 further amplified the social nature of the Web, which reflected so much on blogs, electronic databases, and selective dissemination of information (read-write-execute). The trio of Web 1.0, 2.0, and 3.0, formed the basis of other stages of Web development. The Web 4.0 was designed for complete fusion of the physical world with the virtual world, while 5.0 is about the emotional interaction between humans and computer – a symbiotic relationship (facial and voice recognition, artificial intelligence applications among others) going from Web of contents (Web 1,2, and 3) to Web of thoughts (Web 4 and 5).

Evidence has shown that the library profession has evolved and is constantly transforming to meet the trends in today‟s world. Librarians are challenging themselves by acquiring the requisite training, knowledge, and skills to fit into the new situation or they will be left out in the scheme of events in the information arena. The concept of prosumer has become the order of the day, leading to information explosion, yet, there is a mismatch between what is available and what is needed. Hence, creativity is required of all academic libraries. Meeks (2014) pointed out that, to say that librarianship is a non-creative field, is utterly untrue; librarians are some of the most creative people I have ever met and anyone that has attended at least one library conference will know as much. Meeks (2014) further asserted that creativity in libraries, therefore, entails ability of library staff to develop and put into use new services and products especially with the use of modern-day technology. Examining the academic library in technologically driven environment, Riley (2018) illustrated the introduction into library services from the Library of Congress catalog cards, the use of typewriters, Online Computer Library Centre (OCLC), online library systems, databases, internet everything, to artificial intelligence, with ever-increasing rate of change. Riley (2018) identified the three P‟s outlining the interaction between the library and technology which are perception, plan, and prediction.

The objective of this paper was to assess the innovations associated with Web developmental stages (of technology) and their possible impact in library services.

Table 1: Web developmental <u>stages and</u> corresponding <u>library innovations</u>

SN	Web Stage	Associated tools	Innovations	Library Stages
1	Web 1.0 Linear Web (read-only Web). 1994 - 2000	• Website • Search engines • Web forms	• Library Webpage	• Library 1.0
2	Web 2.0 Democratic Web/bi-directional (read-write Web). 2000 - 2010	• Social media • Blogs • Network • Media sharing • E-mails • Wikis	• Information sharing • Interactivity • User participation • Social networking • Mobile Communities • Tagging	• Library 2.0
3	Web 3.0 Decentralized Web. 2010 - 2020	• Artificial intelligence • Semantic Web • 3D graphics • Big data • Personal Web	• Hybrid libraries • Databases • Improved access to learning resources • Cloud librarianship • Library Mobile App	• Library 3.0
4	Web 4.0 The intelligent Web. 2020 - 2030	• Virtual reality • Cognitive technology • Symbiotic relationship (between man and machine)	• Augmented reality • Active user engagement • Library self-organizing Web services	• Library 4.0
5	Web 5.0 The *introspective* telepathic Web.	• Integrated cyberspace and physical space.	• An encompassing online library service.	• Library 5.0

Web developmental stages and corresponding library innovations

Since its inception, the Internet has been evolving, and becoming more engaging over the last decades. These transformations represent distinct innovations and improvements with which they are distinguished. The library has been in constant flux with Web development such that improvements in distinct Web stage is applied to improve library services. For this paper, library services were placed side by side with possible communication technologies for effectiveness. Such integration and other possible means are outlined in Table 1 and discussed as follows.

Web 1.0 Linear Web (read-only Web). 1994 – 2000

Web 1.0 was Tim Berners-Lee invention that functions as "read only" Web. With Web 1.0, Internet users only read information presented to them. According to Cormode and Krishnamurthy (2008) "content creators were few in Web 1.0 with vast majority of users simply acting as consumers of content." The main function of the Websites was to make information public, and set up an online presence, because it was mainly read-only and static meaning that users could not add or interact with the Website (Berners-Lee, 1998). Hence, the focus was on content. Libraries and other related organizations were able to utilize the opportunity of owning a Website to publicize information relating to their mission and goals. However, this does not give access to the services offered as, at

best, it served as advertising platform for owners of the Website.

Emasealu and Umeozor (2022) averred that the initial purpose for the introduction of technology in libraries was solely for managerial purposes than service purposes. The establishment of the National IT Development Agency (NITDA) in Nigeria, led to the introduction of Information Technology gadgets and Websites in Nigerian Universities. Library Websites gained popularity since they provide information about libraries, and are also used to provide access to library holdings through the Online Public Access Catalogue (OPAC). The library Website has been defined as an influential gateway through which relevant information is provided to patrons. Also, Emasealau and Umeozor, (2022) observed that the "current/modern information world is at par with Web development and Websites were ushered in under the auspices of Web 1.0 (the one-directional Web)". However, many academic libraries in Nigeria are yet to embrace technology nor considered growing with the Web in the provision of information services. This is detrimental to the patronage of library services as users are in synch with the technological tools emerging with Web developmental stages.

Web 2.0 Democratic Web/bi-directional (read-write Web). 2000 – 2010
Web 2.0 – the democratic Web - led to interactive information services that are user-centred/oriented, engaging, content rich, and social in nature (Moseid, 2008). Web 1.0 was essentially a directory, where things can be looked up, and provides information about the organization, product, and work hours, location, and contact information. The year 2000 ushered in Web 2.0 with social media platforms such as Wikis, Blogs, RSS Feeds, FAQ, instant messaging, Websites, social networks and Web-based software for its deliverables (Singh, Bebi, & Gulati, 2011). More importantly, Web 2.0 connected people and bridged communication gap, turning the world into a network of community. This presented the opportunities listed as follows:

- Information sharing – librarians could share information to patron in remote locations. Information dissemination services are no longer bridged by physical boundaries. This is becoming increasingly important in peer-to-peer collaboration in research and dissemination of research findings. Libraries can create the avenue for peers to partner in research across cultures, environment, experience, and knowledge, promoting trans-disciplinary research collaboration and effective selective dissemination of information.

- Interactivity – the hallmark of the 21st century is free communication made possible by information communication technology. Libraries have formed consortia to encourage interaction in form of sharing resources and responsibilities across borders. No library can boast of having, in its collection, all the necessary information materials. The presence of technology has afforded them the opportunity to collaborate and share collections and corresponding financial responsibilities, thereby, providing access to several services available through the library Website. Gavit (2019) provided the list of common Web-based library services including:

    Library Webpage, Web OPAC, Bulletin board services, Ask-a-librarian,

Web forms, digital reference services, online document delivery, interlibrary loan, online help and information skill tutorials, online current awareness bulletins, e-mail-based services, online reference services, electronic journals, online circulation service, electronic SDI services, online acquisition, electronic article alert service etc.

- User participation – Web 2.0 created a philosophical change in libraries from collection-centred to client-based. Grigsby (2019) opined that the library is the entry point-hub from which new technologies are introduced to the entire world. This means that libraries must adopt technology or be left behind since patrons, as major stakeholders, are also users of the emerging technology. It is observed that users are neglecting such library services as reference, communication in information retrieval and use, consultation/counselling services, print-based resources, credibility of information resources, and information literacy programmes (Umeozor, 2020). Therefore, librarians should be repositioned to play an apo-mediating role between information resources and the users, putting patrons at the center of information services. Currently, users are actively considered in the planning of library services.
- Social networking – social media is among the major hallmark of Web 2.0 which has impacted the world at an alarming rate. It has promoted communication, collaboration, production of information among others leading to the concept of prosumer in the life cycle of information. Most libraries have social media accounts where they meaningfully engage their patrons for personalized reference services. Social networking also has the capacity to sustain 24/7 hours of services which does not require physical contact. The impact of social media in libraries was felt during the COVID-19 pandemic (Neog, 2020; Onifade, 2020).
- Mobile Communities – another milestone achievement of Web 2.0 is global coverage. At the click of a button, users can communicate with each other and access information from anywhere in the world. Kwanya, Stiwell, and Underwood (2015) averred that technology has turned the world to a global college, compelling libraries worldwide to consider these technologies to enhance the provision of efficient services.
- Tagging – with capabilities such as tagging, internet users can tag other users to information they found useful online. Librarians, as information managers, can utilize this function to keep their patrons abreast with information relating to their areas of interest and specialization. S

Web 3.0 decentralized Web. 2010 – 2020
Web 3.0 could be said to be the first step in artificial intelligence (AI) where computers are programmed to mimic human thoughts and actions. Web 3.0 primarily defined organized data to simplify processes such as automation, integration and discovery across multiple applications. Accordingly, the basic

idea of 3.0 is to define structure data and link them in order to be more effective discovery, automation, integration, and reuse across various applications (Ossi, 2003). Singh, Bebi, and Gulati (2011) explained that the features of Web 3.0 include transforming the Web into a database, a move towards making content accessible by multiple non-browser applications, the leveraging of artificial intelligence technologies, the Semantic Web, the Geospatial Web, or the 3D Web. This means that Web 2.0 targets on content creativity of users and producers while Web 3.0 targets on linked data sets. Therefore, Web 2.0 championed duplication of social media and platforms across the Web, while Web 3.0 seeks to define and organize these platforms and set of data in related terms and functions to facilitate ease of navigation and use.

Web 3.0 affords libraries the opportunities to programme and deliver smart services capable of running with minimal human input. Arising from the technological innovations in librarianship, it has been argued whether or not librarians should paper programming. Most library activities, especially cataloguing, are based on programming logic. Also, the concept of digital librarian cannot be conceived if librarianship is completely devoid of knowledge in computer science. Hence, Emasealu (2019), asserted that:

> A computer scientist cannot claim to be a professional in information science without library knowledge, and on the same note, librarian needs the computer science knowledge in the field of information science. It is upon this very fact that computer science is unquestionably much involved in the paper of

> information-related matters as it involves coding of data into machine-readable forms, and transmission, manipulation, storage, retrieval and presentation of these data. …the librarian"s skills which traditionally include sorting books and information resources in codes through the process of cataloguing and classification ought to be improved upon. Consequently, library management software proficiency and Web-based library services would demand a certain amount of programming knowledge, in at least, basic programming language such as the Hyper-Text Mark-up Language (HTML), Standard Generalized Mark-up Language (SGML), and Extensible Mark-up Language (XML), among others.

Consequently, librarians could benefit from Web 3.0 through:

- Artificial intelligence vs hybrid libraries – the Web 3.0 introduced artificial intelligence to mimic human intelligence, thereby strengthening the relationship between man and machines. This innovation can be useful in libraries. The idea of jettisoning physical library may not be possible due to the relevance of reference information services and print materials. The tendency that everything is on the Web, and thus, patronizing unverifiable information sources, as was experienced during COVID-19 pandemic, necessitates a

hybrid library which is a library that offers physical and virtual information services. This promotes remote access to library holdings, increase library patronage, and enhance knowledge acquisition and creation. It can be used in the design of automated library services such as giving directions in libraries, and also offer some simple machine assistance. Other importance of Web 3.0 in library includes personalized user services such as reminders, update on new arrivals, record-keeping among others.

- Semantic Web versus databases – this is an effort to characterize knowledge in a way that computers can automatically make decisions as a result of a consistent internet use data of a user. The Web is capable of taking a user‟s internet use or search history to make personalized suggestions for the user‟s Web search results. These are mostly saved internet cookies that enable the Web to synthesize the data and analyze them to make intelligent guess through search results presented to users once they are connected to the Web. This could save the time of library patrons. It could, also, aid in research by providing prominent related works that a researcher is not aware of. Libraries, therefore, can utilize this to provide access to relevant information resources and services to their patrons.

- 3D graphics vs improved learning resources – the emergence of Web 3.0 brought many innovations. 3D graphics allows the representation of objects either in drawing or printing in a near-real life appearance beyond the two-dimension of length and width. A good example is the 3D printers which print replica of physical objects. This could be used in libraries to aid visual learning especially for orthopaedic students since 3D printers could be used to print replica of bones to treat accident cases. Also, most students learn easily through visual acuity. 3D printers can be handy when the real object is not available or expensive to acquire. Libraries can, therefore, acquire the 3D technology to enhance their learning resources.

- Big data vs cloud librarianship – with the intricacies of the Web, the pattern and structure of data have changed drastically. There are millions of data in the Web from different platforms. Thus, data managers now have more data at their disposal. Prior to Web development, libraries were faced with the problems of retrieval, space and storage. Currently, the Web offers unlimited spaces, timely and borderless access to contents. Cloud librarianship signifies a radical shift from ownership of locally operated servers to Web-based collections and services. Starr (2011) observed that the era of physical storage is gradually eroding away and opined that, to avoid unintended consequences, there is the need for *'librarian in the cloud'*. This was explained as librarians "behind the wall" and collections "in the cloud" (Starr, 2011).

- Personal Web vs library mobile app – Web 3.0 allows for privatization of Web usage. This may be very useful for libraries. Libraries have social media account for correspondence activities. Since, the process of feedback has evolved, attending to

users with varied information needs promptly could be tasking for the reference librarian. This could be ameliorated through the adoption of mobile applications which involves bringing into one-fold the innovations of the Web 3.0. The semantic nature of the Web 3.0 will provide the big data required to programme a mobile application (artificial intelligence) for the library, where registered patrons can access information services at the click of a button. It will also aid in the organization of big data to create user statistics in which patrons will be linked to their individual accounts.

Web 4.0 The intelligent Web. 2020 – 2030
Web 4.0, according to Benito-Osorio, Peris-Ortiz, Armengot (2013), is "based on wireless communication (mobile devices or computer) connecting people and objects whenever and wherever in the physical or virtual world in real time". This denotes an intelligent Web capable of functioning as a personal assistant to the user by keeping records and tracking activities of the user. One of the features of the Web 4.0 is the „Internet of Things" (IoT). IoT means the interconnectedness of devices (computers or mobile devices) on the Web across users such that they can share data. In libraries, the concept of smart strategies (adapting to dynamic information environment and changing information seeking behaviour of users) applies to this stage of Web development. The primary function of every library is the acquisition, preservation of human knowledge and provision of accurate and timely information services to patrons.

Traditionally, libraries plan and provide services and resources while patrons are encouraged to visit (via virtually or physically) to utilize them. However, with the technology of Web 4.0, librarians deliver library services to the patrons. To avoid the case of information-explosion, Web 4.0 systematically organizes information according to different categories of patrons and their information needs. It is similar to creating folders on a desktop with titles denoting the content of each folder such as documents, music, movies, office files among others. Users update these folders as often as the information relating to them are sent into the computer. They may not have immediate need for the information, but when the need arises, they simply open each folder and utilize information therein. Similarly, the Web activity of Web 4.0, the intelligent Web (personal assistant) utilizes the browser cookies to categorize information and activities often engaged in on the Web. It goes further to update the Web folders of individuals on daily basis. It should be emphasized that whatever the data are used for depends entirely on the user.

It is therefore, necessary for librarians, as information specialists, to act as mediators between data shared by their patrons and information made available to them on the Web. This could be achieved through utilizing:

- virtual reality to augmented reality in learning resources
- cognitive technological processes to improving active user-engagement, and
- symbiotic relationship between man and machine to library self-organizing Web services.

Web 5.0 The *introspective* telepathic Web
The Web is steadily developing, and the Internet is evolving towards Web 5.0. In office parlance, the Web 4.0 is a „personal assistant" which can be directed, while the introspected Web 5.0 is a „supervisor" that notes all your actions and inactions. Web 5.0 is seen as emotive and symbolic Web that

has the capacity to communicate with humans. It seeks to explore human emotions. In this way, it will pave the way for more personalized experience, thus, attracting more people. In other words, Web 5.0 will be individual centered, conceivably allowing a Website to create a different experience for each individual. It would attempt to perceive the emotions of an individual and respond appropriately (Kamil, 2008, Beltran & Vega, 2003).

Another daunting challenge for librarians may be to effectively key into this forth-coming innovation by designing an inclusive library service. With the emotion mapping technology, librarians may no longer need to decipher information needs of users but categorize information into classes, allowing technology to select the suitable information based on the detected emotions of patrons (such as sadness, happiness, gloomy, depressed, among others). Libraries are becoming more efficient in their service delivery with the adoption of emerging technologies. This implies that the frontiers of librarianship are shaped by Web development, explaining the constant flux of service delivery in libraries. Thus, it is appropriate to state that libraries are constantly encouraged to review their philosophy to accommodate emerging technologies in tune with Web developmental stages.

Conclusion
The 21st century has been regarded as knowledge economy/information era. This has made the job of librarians tedious as they strive to ensure access to accurate, relevant and timely information, while grappling with professional transformation. Also, the Web generations (Web: 1.0, 2.0, 3.0, 4.0 and 5.0) have greatly influenced information seeking behaviour of library users. This scenario is also changing the information business as the situation is

becoming "rebrand or perish" for libraries, especially for academic libraries with patrons that access varied information sources. This paper explored Web developmental stages and their possible usefulness in academic libraries. It outlines the importance of technology in present-day library services for the tech-savvy patrons. The paper highlighted the technological innovations and tools associated with each Web stage and explained how these could be adopted and integrated into the mainstream of library operations to ensure improved service delivery especially in academic libraries. It equally stressed that technology has proven to be the future of information management and dissemination and urged libraries/librarians to embrace technologies. This would enable them to stay in the business and move with the trend in the information industry. The paper also advocated for the incorporation of computer science in the library school curriculum to train librarians who are ICT-competent to champion the course of ICT-compliance library.

Based on what has been presented, the following are recommended:

1. Advance computer skills should be introduced in library and information science programme curricula.
2. Provision of training and retraining of librarians in ICT skills.
3. Intensified effort to make library ICT-compliant.
4. Provision of adequate fund dedicated to technological advancement in libraries.

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