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ARTICLE

# A Review of Librarians as Digital Literacy Drivers in an Age of Generative AI Surrounded by Ethical Conundrums

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**Abstract**

The invention and recorded successes in the use of Generative Artificial Intelligence (Generative-AI) has given rise to a period of new ideas, changing the way data exist, produced, put into use, broken down and applied. This technology presently is permeating virtually in all human fields of endeavor including education which is the hallmark of societal development and sustainability. The irony of it is that there are two sides to this technology, the good and the ugly and librarians being drivers of information literacy seem to be in-between the two sides to bring a balance and orderliness within the information disordered ecosystem by ensuring that users of all sort are equipped with requisite Information Literacy (IL) skills. This work therefore is a review of Generative-AI intelligence as a concept, information literacy, digital literacy and ethics as well as Generative-AI ethical challenges and risk, librarians' role as information literacy drivers in a Digital era and librarians' expected functions as Generative-AI literacy facilitators that will help curb ethical challenges and risk posed by Generative-AI in the global digital ecosystem.

**Keywords:** Generative-AI; Artificial Intelligence; Librarian; Information Literacy; Digital Information Literacy; Ethical Challenges; Digital Ecosystem

## 1. INTRODUCTION

In content creation, what is on the lips of everyone, is the use of artificial intelligence in creating novel content in the like of images, text, audio, music and audio and the off shoot of AI that is utilized for these services is the Generative artificial intelligence; a branch of AI powered by foundation models known as large AI models, The uniqueness of these models is that, they requires only minimal training to make them suitable for targeted user cases with very little sample of data thereby making its usage even by a beginner, very famous and at the same time, perform multi-task as well as out-of-the-box tasks which include; providing answers to questions, summarizing and classifying of issues among others [1].

Emphatically, the invention and recorded successes in the use of Generative Artificial Intelligence (Generative-AI) has given rise to a period of new ideas, changing the way data exist, produced, put into use, broken down and applied. This technology is prepared in such a way as to bringing into the digital ecosystem, a new way of communication, multimodal experiences that is out to change the way we interact with information, their forms as well as with one another. Presently Generative AI, is penetrating virtually all human fields of endeavor including education which is the hallmark of societal development and sustainability and libraries and librarians not doubt are in the fore-front of knowledge transfer which is what education is all about. The irony of it is that there are two sides to this technology, the good and the ugly. Librarians being driving access to knowledge and facilitators of information literacy, seem to be in-between the two sides as to bringing a balance and orderliness within the information disordered ecosystem. This they do, by ensuring that users of all sort of information, are equipped with requisite Information Literacy (IL) skills aimed at guiding them against misinformation, mal-information and disinformation. A situation that has plagued the global society as a result of the emergence of information super highway called the internet and with the birth of the social media, the whole situation is worsened and further compounded by the astronomical growth in

information that has led to information overload. With this development, the emergence of generative-AI has raised eye-brow globally considering the ethical conundrums that are associated with its application and utilization.

As revealed, generative-AI has distinguished itself in the global contemporary educational discourse. In this regard, needs to be treated with all the seriousness it deserves, as it is presently one of the outstanding determinants of the limit of teaching and learning on the fact that teaching methodologies are being remodeled, with existing educational processes being re-modified thereby, raising students' engagement and achievement. A development that may completely transform the entire global educational process [2,3]. The implication is that since generative AI uses clever and experienced algorithms that are regularly trained on how to use large datasets, it allows machines to produce material that can singlehandedly with supervision mimic the creative processes of humans thereby making academic procedures seamless. These technological prowess have risen people's excitement, interest and hope on the potentials of generative AI. On the other hand, there is a moral question that begs for an answer as it concerns the ethical issues that have risen as a result of use of the new technology and call for all and sundry in the education sector to purse and ponder for an answer. The assertion therefore is the rapid advancement of generative AI, has its own associated ethical conundrum that if left abated, will endanger, the appropriate application, impose social consequences and affect honorable and noble usage of these new technologies. There is then call for action in order to guide against lack of academic integrity in the educational system. The allayed fear regardless of the gains of AI is that it poses danger against the traditional pedagogical domain and fundamental ethical conundrum like bias in training dataset that may metamorphose into showing differences outputs, likely misuse of them with the intention of harming others and unclearly displayed boundaries between generated and real information [2].

Ultimately, emergence of generative AI, is not only a threat to the global educational system but also to librarians whose traditional duty, is to inform and educate information users on information sources and materials that are appropriate through information literacy campaigns. In tandem with global recognition and utilization of information and communication technology in all aspect of our everyday lives and with contemporary skills requirement, students of almost all levels have come to embrace AI as a way out of every academic stress. This is on the assumption that AI now does the critical thinking for them without putting into consideration the implications or the aftermath. With this paradigm shift, there is every need for information managers to salvage this state of uncertainty by ensuring that our educators and students do not fall victim of this technological jingoism and the belief that information sourced from AI is completely factual.

In a situation like this, librarians as professionals in information management and AI-information literacy and ethical adherence facilitators are expected to bring to bay their professional prowess and save ignorant information users from this quagmire and morass more so in this digital era. The implication is that librarians as the bridge between the information and the users should assume their rightful position by also being the bridge between generative-AI and students as well as teachers or lecturers as the case may be and carrying them along the confusing and so hard to understand aspect of generative-AI domain. This they can do, by acting as information organizers, fact pointers, ware-house of knowledge and encouraging latent critical thinking capabilities, ethical and netiquette considerations, stimulating generative-AI student-lecturer relationship and making available a deeper understanding of the global digital ecosystem.

It is against this backdrop that this write-up becomes imperative with a view to navigating the digital information literacy horizon in relation with Generative-AI and associated ethical challenges as well as the role of librarians in making users understand these challenges that surround Generative-AI and ways to mitigate them.

## 2. SEFINITION OF CONCEPTS

### 2.1. Artificial Intelligence

Artificial intelligence as a branch of information and communication technology is making education and information handling faster and more efficient. It is further breaking the paradigms of the past on how to learn and do things in effective and efficient manner. Artificial intelligence (AI), which

is simply described as a machine that has the capacity to mimic intelligent human behavior, has developed from being a fiction to a science of reality and a moving wind that has affected reasonable aspect of man's daily life. Generally, AI points to various tools and systems aimed at providing robots the capability to perform operations that normally that require human knowledge to perform [4]. This include, problem solving ability, knowledge to pick up from experience, understand human language and as well as see things as human does. The level of technological development in machine learning as well as neural networks and the power of computing power did master the growth of AI, bringing a global unimaginable possibilities that were unthoughtful of in the past.. AI is also described as the study of human intelligence processes by machines, more so by computer systems [5], besides being so amazing in operations, it is also a positive force for the global betterment. Artificial Intelligence (AI) so to speak, was seen as an important branch of computer science in 1956 during the Dartmouth Conference thus was perceived as a technology that has the ability to carry out research, develop and come up brain that is of human replica that will facilitate computer powered machine to reason and operate like humans [6].

### 2.2. Generative Artificial Intelligence

The term Generative AI, came into global knowledge as a technological lexicon in the last two decades but available facts revealed that generative AI has been part of human existence tens of years. The contemporary generative AI technology however, emanated from the breakthroughs recorded on machine learning back in the early twentieth century. Available evidence did show, that ELIZA was developed in 1964 by Joseph Weizenbaum then a scientist at MIT. ELIZA by development was text-based natural language processing application that used pattern-matching scripts to respond to typed natural language inputs with empathetic text responses and this is recorded as the first chatbot christened a 'chatterbot' at the time. In 1999, the first graphical processing unit called GeForce was invented by Nvidia, Abinitio developed to deliver smooth motion graphics for video games and this did become the stepping stone for developing AI models and the contemporary famous mining crypto currencies [7].

Furthermore, in 2004, a relatively modern example of generative AI based on a Markov Chain called Google autocomplete was developed. It is, a mathematical model developed in 1906 and appeared first as, variational auto-encoders (VAEs) while the first generative adversarial networks (GANs) and diffusion models appeared 2014. In 2017, a paper documenting the principles of transformer models titled "Attention is All You Need," was published by a team at Google Brain known as Ashish Vaswani with a group from the University of Toronto. The paper is widely acknowledged as enabling the most powerful foundation models and generative AI tools being developed in recent time. While in 2019-2020, saw OpenAI rolling out its GPT (Generative Pre-trained Transformer) large language models, GPT-2 and GPT-3 while in 2022, it went ahead to introduce, a front-end to GPT-3 that generates complex, coherent and contextual sentences and long-form content in response to end-user prompts known as ChatGPT.

The assertion is that though ChatGPT has its shortcomings, it was known to be famous and these disparities did effectively become a limelight for the development of generative AI developments and the release of the product which came at a furious pace with the releases of Google Bard (now Gemini), Microsoft Copilot, IBM watsonx.ai, and Meta's open-source Llama-2 large language model inclusive [7].

The implication is generative AI therefore is envisaged as a machine-learning model that is tutored and programmed to come with new data, instead of making a prediction about a given dataset. A generative AI therefore is system that has mastered how to generate more objects that that are replica of earlier data it was trained on [8]. Generative AI is further described as deep-learning models that can through raw data obtained learn how to generate statistically probable outputs when prompted. It is therefore that offshoot of artificial intelligence that can create original content like text, images, videos, audio, or software code when prompted by a user. This implies that generative AI as technology depends on sophisticated machine learning models called deep learning models that simulate the learning and decision-making processes of the human brain. These models identify and encode patterns and relationships in vast amounts of data, enabling them to understand natural language requests and generate relevant new content

Furtherance, Generative AI also refers to the use of AI to create new content, like text, images, music, audio, and videos. Generative AI is powered by foundation models (large AI models) that can multi-task and perform out-of-the-box tasks, including summarization, question and answer, classification and more. Plus, with minimal training required, foundation models can be adapted for targeted use cases with very little example data. Generative-AI is also perceived as a major development in the field of AI, especially as it concerns its capacity to produce fresh, original information [9]. Unlike the AI models that relies on already established rules, generative-AI does not instead, utilizes sophisticated algorithms with which on its own produces information materials. This is concerned with producing actual text as well as, true-life graphics and music that can mimic the intellectual creativity of the humans. Notable examples include, linguistic models like GPT-3 (Generative Pre-trained Transformer 3) and picture generators with DALL-E, that have shown that they have what it takes to generate extraordinarily creative and well fused outputs [10].

In its operations, generative-AI utilizes machine learning (ML) model to master the ways and links in a dataset of man-made content. With the mastering of the patterns, generative AI will now generate a novel pattern that is a replica of that created by human. It then uses the learned patterns to generate new content. Using supervised learning method, is the most commonly known means of training a generative AI model. In which case, the model is given a set of human-created content and corresponding labels to master and from it, the generative AI will replicate same. Suffice to say, that generative AI works on large content, creating the desirable understanding and responses through text, images and structures that are user-friendly. Highlighting on the imperativeness of generative AI, the revelation is that it can be utilized in improving customer relationship via improved chat and search experiences, exploring great amounts of non-structured data via interactive meetings and brief statements and also in assisting with monotonous tasks such as responding to proposals requests (RFPs), making marketing content look local in languages and cross-checking how compliance are clients' contracts among others [1].

Being specific, in education generative AI has been noted to be reshaping teaching and learning. In that teachers, students as well as experts in education have affirmed to the impact generative AI has on education. The assertion is that, it is in reshaping teaching and learning approaches. The further assertion is that the notable gains of enhancing productivity in school activities has propelled increased investment in Generative AI solutions for education. As reported, by 2033, the quantum of generative AI in the education market may grow from $299, 8 million in 2023 to $7,701.9 million [8]. According to Vishwa Gaul's reports]. There are also indications that teachers and students are applying generative AI to their academic works and the Generative AI application trend in education shows improving signs considering the fact that both teachers and students adopting it to their work [11]. As buttressed by the TeacherTapp survey which was conducted in November, 2023, 42% of primary and secondary teachers in the UK rely on generative-AI tools to back-up their work [12]. While the 2023 report of Ofcom further substantiates the ease of approaching Generative AI utilization among pupils and students. According to the report, 74% (16-24), 79% (13-17) and 40% (7-12) young learners are using AI for study [13] with standard AI tools in use for education being ChatGPT, Bing, DALL-E and Midjourney.

Generally, applications of generative AI in education has been noted to improving productivity and outcomes for school management, parents and students as well as saving time for educators by creating lesson resources, planning lessons and streamlining administrative processes, assisting with administrative tasks and improving operational efficiencies, designing formative assessment activities, analyzing data efficiently and creating resources to support differentiation [14].

On the other hand, the observation is that, adopting Generative AI in education raises concerns about overdependence, knowledge deficiency and insufficient digital infrastructure during the integration journey [14].

### 2.3. A Generative Model

A generative model is a machine learning model designed to create new data that is similar to its training data. Generative artificial intelligence (AI) models learn the patterns and distributions of the training data, then apply those understandings to generate new content in response to new input data. In other words, the model masters the inherent nature of the underlying patterns and distributions of

data and through the approach, come–up with new and similar data. A generative model is therefore, a type of machine learning model that aims to learn the underlying patterns or distributions of data in order to generate new, similar data. In essence, it could be liken to teaching a computer to dream up its own data based on what it has seen before. The significance of this model lies in its ability to create, which has vast implications in various fields, from art to science [15]. It is these models that generate new images, text, audio and other types of data with which generative AI operates

Generative modeling is also used in unsupervised machine learning (ML) to describe phenomena in data, enabling computers to understand the real world. This AI understanding can be used to predict all manner of probabilities about a subject from modeled data. A generative model also uses artificial intelligence (AI) and statistical and probabilistic methods to create representations or abstractions of observed phenomena or target variables. These representations can then be used to generate new data similar to the observed data [16].

For clarity sake, Generative model could be liken also to a student who is taught how to draw animals. After showing them several pictures of different animals, the student begins to understand the general features of each animal. Given some time, the student might draw an animal he has never seen before by combining features he has learnt. This is analogous is to show how a generative model operates. The implication is that it learns from the data it is exposed to and then creates something new based on that knowledge. Inherently, generative models have penetrated mainstream of our lives, revolutionizing the way we interact with technology and experience content.

### 2.4. Information Literacy

Information literacy is a set of abilities requiring individuals to 'recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information [17]. As expressed by UNESCO information literacy empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals. Information-literate people are able to access information about their health, their environment, their education and work, and to make critical decisions about their lives. To this end, information literacy and lifelong learning have been described as the beacons of the information society, illuminating the courses to development, prosperity and freedom [18].

Coming to the global digital ecosystem, information literacy demands that users should have the skills to utilize and apply information and communication technologies in accessing and creating information. Closely connected to digital competencies are computer literacy skills also known as ICT skills and media literacy skills which involves understanding the various kinds of mediums and formats through which information is transmitted. A case in point, one requires, both the technical skills to use the internet and the literacy skills to interpret the information to have the ability to navigate in cyberspace and negotiate hypertext multimedia documents.

It was further revealed by the Alexandria Proclamation on Information Literacy and Lifelong Learning 2005 that for one to be truly 'information literate' it requires that the person will at the same time, develop among other things, awareness of how to engage with the digital world, how to find meaning in the information discovered and how to articulate what kind of information required as well as how to use information ethically, understand the role one can play in the communication in his or her profession and how to evaluate information for authenticity and source [19].

### 2.5. Digital Literacy and Ethics

To properly understand digital literacy ethics, a look at ethics as a concept is a necessity. Ethics as define is the philosophical study of moral phenomena [20] that investigates normative questions about what people ought to do or which behavior is morally right while Encyclopedia Britannia defines it as the philosophical discipline concerned with what is morally good and bad and morally right and wrong. Its subject consists of fundamental issues of practice [21]. On the part of Digital Literacy, it was initially focused on digital skills and stand-alone computers but with the emergent of the internet and social media its use has shifted some of its focus to mobile devices and to other evolving definitions of literacy that recognize the cultural and historical ways of making meaning though, digital literacy does not replace traditional methods of interpreting information but rather extends the foundational skills of

these traditional literacies. Invariably, digital literacy should be considered a part of the path towards acquiring knowledge [22].

All the same, digital literacy is seen by ALA (2017) as an individual's ability to find, evaluate, and communicate information using typing or digital media platforms. It is a combination of both technical and cognitive abilities in using information and communication technologies to create, evaluate, and share information. While UNESCO defines it as the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship [23]. The whole idea is embedded under competences that are variously referred to as computer literacy, information communication technology literacy, information literacy and media literacy. As noted by International Telecommunications Union digital literacy consists of equipping people with ICT concepts, methods and skills to enable them to use and exploit ICTs [24].

The underlying fact is that in this digital ecosystem where we live, where technology is permeating every aspect of our lives, the concept of digital ethics has become increasingly imperative [25]. A digital ecosystem per-se is a group of interconnected information technology resources that can function as a unit. Digital ecosystems are made up of suppliers, customers, trading partners, applications, third-party data service providers and all respective technologies. Interoperability is the key to the ecosystem's success [26].

In this regard digital ethics is referred to as the moral principles and standards governing the ethical behavior and responsibilities of individuals, organizations, and governments in the digital realm that involves considerations of fairness, transparency, privacy, security, and technology's impact on individuals and society as a whole [27]. In today's interconnected world, where digital technologies such as artificial intelligence, big data analytics, and the internet of things are ubiquitous, digital ethics play a critical role in shaping how we interact with technology and each other. It ensures that technological advancements are aligned with ethical values and societal norms, safeguarding against potential harm and exploitation.

There is a correlation between digital ethics and digital literacy and that is that while digital ethics presents the moral background for responsible and conscientious coming together in the digital sphere, digital literacy provides the technological and emotional abilities to go around it. This implies that both serve as most important tool for making morally sound decisions in the intricately connected global digital technology.

## 3. GENERATIVE-AI ETHICAL CHALLENGES AND RISKS

As generative AI is getting popular and more acceptable in educational sector, institutions, businesses and organizations with these set ups working to realize the gain of the technology, they are also faced with a known hydrated headed monster, the ethical conundrum associated with its utilization. The being expressed is that the use of generative-AI poses a number of moral concerns that need to be meticulously handled as to running into deep waters [28]. To this, there is need, to investigate and work as to understanding the complex ethical danger associated with generative-AI. Putting into considering the creative capabilities of generative-AI, the submission is that it poses a number of complex ethical dangers that call for care that will facilitate its purposeful advancement, utilization and adoption as well as considering how to tackle ethical issues such as; unintentional discrimination and bias, false information and manipulation, invading of privacy, absence of responsibility, unlawful utilization of one's data, risks to security. Others are, loss of employment, informed consent, dual-use predicament and regulatory obstacles [28].

As has been noted generative AI is not different from other forms of AI that have been known to affect ethical issues and risk surrounding data privacy, security, policies and workforces adding that apart from the ethical issues and risk mentioned that are also linked with generative AI, it can also potentially introduce a series of new business risks like misinformation, plagiarism, copyright infringements and harmful content. Lack of transparency and the potential for worker displacement are additional which also need to addressed by enterprises. In fact many of the risks posed by generative AI as further revealed are pronounced and more concerning than those associated with other types of AI [29]. In this regard the assertion is that those risks require a comprehensive approach, including a clearly defined strategy, good governance and a commitment to responsible AI. As a result, it is advised that any corporate culture that embraces generative AI ethics must put into consideration eight

important issues [30]. These issues which are envisaged as ethical challenges and risks are: distribution of harmful content, copyright and legal exposure, data privacy violations, Sensitive information disclosure, workforce roles and morale, data origin, lack of explainability and interpretability, unintended discrimination and bias as well as falsification and manipulation of information, lack of responsibility, unauthorized usage and endangered security [31-36].

## 4. LIBRARIANS AS DRIVERS OF INFORMATION LITERACY IN A DIGITAL AGE

In the changing sojourn of human technological creativity, librarians have played pivotal role by being adaptable, visionary and dedicated to making knowledge accessible despite rapidly changing technological landscapes [37]. The librarians' traverse from conventional caretakers of physical collections to creative digital stewards highlighted their all important role in reshaping the information domain. This involves evolution from custodians to facilitators of digital information products and services; harnessing digital resources; information literacy advocates; integration of emerging technologies; digital access and preservation; community engagement in the digital realm; advocacy for open access and digital inclusion; as well as integrators of technology and futurists. These roles are further explained below.

### 4.1. Finding Ways in the Digital Information Ecosystems

With the combination of digital ethics and literacy, users are better placed to navigate the complex global digital information ecosystem with ease. Being aware of ethical challenges around the surrounding online partnership, digital communication and information sharing, they develop into strong users and producers of digital content that enhances the human race sustainability.

### 4.2. Development from Bookkeepers to Digital Information Outputs and Services Facilitators

The digital age has given a new coloration to the duties and responsibilities of librarians in line with the trending and advancing technologies of our time. Librarians as information professionals have grown beyond their traditional role as keepers of books to drivers of various products and services of digital information. Librarians' capability to move in line with trending technologies and other digital maneuvering is well noted by the ways they have come to be masters in digital information management, dissemination and information services provision.

### 4.3. Tapping from Digital Resources

The digitization of resources was openly received by librarians as they did to automation of libraries. This is because they believe that both are great opportunity for libraries to gain from digital resources with a view that they will aid in meeting the information needs of teeming library users without hindrance. With this, librarian were able to come up with digital skills that facilitate the performance of their roles effectively in acquisition, processing, organizing and maintaining digital collections which paved way for them making volumes of repositories of human knowledge accessible with a click of the button to global users. The ability of librarians to utilize and go through digital resources is now a sine-qua-non as the operations in the present digital ecosystem needs a well-grounded technologically knowledge and readiness to meet library customers' information needs who are mostly regular internet users.

### 4.4. Supporters of Information Literacy

With the emergence of digital millennium, heightens the imperativeness of Information literacy in that the digital ecosystem is presently saturated with many complicated parts hard to tackle problems which if not checkmated articulately will outweigh its useful contributions on human relationship and communication. In this context, Librarians have assumed leading position in educating users on digital information and information literacy by aiding to them to meticulously evaluate and go through the ways of the complex online information as well as utilization of digital tools with care and efficiency. They have also assumed the place of digital educators transferring knowledge that is necessary for going around the saturated global information digital ecosystem.

### 4.5. Combination of Newly Developing Technologies in Library Services

For the sustainability of knowledge, librarians have relentlessly been combining newly developing technologies into library services with a view to providing efficient and effective services and to ensuring that, they met the information needs of their teeming users in tandem with global best practices and technological trends. The gains of utilizing these emerging technologies by librarians are visible in the use of online catalogs and virtual reference services such as Chabot to improving users' experiences and promoting clienteles satisfaction. The purpose for which librarians and libraries embraced library automation and other emerging technologies such as; social media technologies, artificial intelligence (AI), block-chain technologies, augmented reality (AR), data visualization and data analytics as well as gamification is to improve information retrieval and optimization of library operations and services.

### 4.6. Accessing and Preservation of Digital Information and resources

In order to safeguard precious digital information and resources for the unborn without hindrances, libraries are working tirelessly towards conserving and preserving them. They have devised means of tackling data security, data integrity and storage and have also embarked on retrospective conversion of outdated materials, which will in turn prolong the existence of repositories of digital knowledge.

### 4.7. Librarians as the Link between Community and the Virtual World

Librarians with open arms, accepted global digital ecosystem as an aspect of their extension services. This acceptance, is aimed at encouraging the accessibility of information beyond the enclosure called the physical libraries as well as to giving the community that sense of belonging as an aspect of digital world, forming online forum, hosting virtual events and digital outreach activities which are deemed necessary. In this regard, Librarians have become links between the people and the virtual world as they now bring as they bring them together as people with one thought and idea to discuss and offer solutions to identified societal challenges.

### 4.8. Librarians as Open Access and Digital Inclusion Supporters

In recent time, librarians play pivotal roles in ensuring that information and knowledge are made available and accessible for all and sundry regardless of stratum, status and background free of charge. This they do, by supporting programs projected at closing the digital gap and ensuring that all society have desirable access to digital resources and also the benefits of emerging technology.

### 4.9. Future Technology Watchers and integrators

Librarians today are thinking beyond as they are ever looking ahead of time based on trending technology. They are becoming creative and innovative, coming up with new ideas to facilitate effective and efficient library service delivery in a digital age. As a result, they now partner other stakeholders in the information and communication technology such as computer engineers and analyst in building and assist in shaping and determining how information in the future should be shared and disseminated.

### 4.10. Conundrum and Ethical Issues

With the advancement in technology, librarians as facilitators of digital literacy and information managers, are faced with hydra-headed challenges and the problems of how to handle moral dangers associated with the use of digital information. These challenges are in the areas of; privacy issues, digital rights as well as the moral utilization of emerging technologies such as the AI, generative AI, blockchain technology, machine learning among others. The underlying fact, is that today's librarians, have metamorphosed into moral information practices defenders, thereby supporting and promoting the proper use of information and communication technologies as they emerge.

## 5. LIBRARIANS AS GENERATIVE-AI LITERACY DRIVERS: THE EXPECTATIONS

With the emergence of generative AI and it associated benefits as well as the challenging ethical issues and risks to libraries and their users, the responsibilities of libraries have become multifaceted. Librarians as prime-Uno in advocacy and promotion of contemporary information related technologies it behooves them to assist users in going through the deep waters of generative-AI literacy. It is against this backdrop that it was opined that librarians are becoming crusaders of generative-AI literacy, with the determination of enhancing proper understanding, critical thinking and guiding utilization of these

all-embracing technologies by shortening the knowledge gap; organizing resources for generative-AI education, organizing workshops and training programs as well as the inculcation into information literacy programs, stating ethical considerations and careful utilization, encouraging education involving all fields, community engagement and public discourse and working in line with emerging technologies [38].

### 5.1. Closing the Knowledge Gap

Librarians as information managers are believed to be better placed to shorten the knowledge gap that exist in generative-AI literacy and by extension digital information literacy. It is expected that librarians should up their sleeves to determine those challenges posed by generative-AI and also educate and equip both library users and the general public with skills to navigate the trouble waters of generative-AI and other emerging information related technologies.

### 5.2. Organization of Resources for Generative-AI Education

Librarians should ensure that all books and literary materials that enhance and promote generative-AI literacy should be selected, acquired and made accessible to users if possible there should be a bibliographic compilation of all generative-AI literacy collections for easy accessibility for all. They can also take steps further by organizing workshops, seminars and exhibitions regarding the systems and everything therein.

### 5.3. General Training

Libraries and librarians should as a social responsibility organize at intervals workshops and regularly hold training sessions that are interactive to aid clear some uncertainty concerning generative-AI and endeavor to offer practical insights into the modus operandi of the technologies and everything they are associated with.

### 5.4. Integration of Generative-AI Literacy into Information Literacy Programs

Librarians should play a pivotal role in ensuring that generative AI literacy is integrated into the wider programs of information literacy making it compulsory for all to study with emphasis on striking a balance between human generated content and that generated by generative AI, understanding bias in algorithms, and cultivating ethical considerations in the use of Generative-AI technologies.

### 5.5. Interdisciplinary Nature of Technological Trends

Librarians are multifaceted and ubiquitous when it comes to knowledge and information needs for this reason, they have proper understanding of the place of technological trends in every discipline and human endeavor. To this end, they support multidisciplinary initiatives in academic disciplines and work towards their successes and it is believed that generative AI will not be an exception. The expectation is that librarians should establish forums for discussion encouraging a holistic view of generative-AI that goes beyond its technological parts.

### 5.6. Extension Services

One notable work with which libraries stand out is that of community service also known as extension service. In this present dispensation, librarians are expected to get involved with communities and organize meetings in which discussion on oral and effect of generative artificial intelligence on the society. The community meeting should be designed in a way that experts would be called to lecture to raise the desired awareness and encourage elitist general discussion on the proper adoption of AI in the areas of ethical challenges such as giving accounts, invade of privacy and biasness of data as well as panel discussion. The notion is that as experts in information management, librarians can through the selection of materials patterning to AI ethics contribute to the discussion and spur users into making wise choices [39].

### 5.7. Ethical Considerations and Responsible Use

Librarians are expected to promote proper utilization of generative-AI and ethical considerations by helping library users in solving the problem of moral challenges involving prejudice, privacy issues

and possible abuse and by encouraging a culture of useful and contemplative interaction and by promoting discussions on the implications of Generative-AI on society [40].

## 6. CONCLUSION AND RECOMMENDATIONS

Ultimately, the emergence and advancement of Generative Artificial Intelligence (Generative-AI) has created an era of creativity and like a wild wind is blowing altering the way data is being created, generated, engaged, analyzed and utilized. It has ushered in a new wave of interactive, multimodal experiences that is transforming how we commune with information, brands as well as with one another. This technology especially in developed nations of the world presently is penetrating virtually in all human fields of endeavor including education which is the hallmark of societal development and sustainability. In the contrary, it has been discovered that there are two sides to it, the good and the ugly. Ugly side of it is that there are many risks posed by generative AI. Like other forms of AI, it has been discovered that generative AI can effect ethical issues and risks surrounding data privacy, security, policies and workforces. Generative AI technology can also potentially introduce a series of new business risks like misinformation, plagiarism, copyright infringements and harmful content and lack of transparency among others. In some quarters, some experts believe that risks posed by generative-AI are enhanced and more concerning than those associated with other types of AI. Those risks require a comprehensive approach, including a clearly defined strategy, good governance and a commitment to responsible AI and librarians being driving access to knowledge and information literacy seem to be in-between the two sides as to bringing a balance and orderliness within the information disordered ecosystem by ensuring that users of all sort are equipped with requisite information literacy skills with a view to guiding users against misinformation, mal-information and disinformation that have been heightened by the emergence of generative AI and social media. Since the unclear understanding between created and original content raises moral concerns about how to take care of information, honesty and public trust in information sources, a theoretical framework that brings together digital ethics and digital literacy supports reliable utilization of technology and allowing people to create impact in the digital age. Librarians as information managers and facilitators of information literacy as observed from the reviews are seen to be better placed to bell the cat as it concerns equipping library users and general public with desired skills to successfully navigate this digital ecosystem. It is against this backdrop, that these suggestions are put forward for application, if librarians are to meet the needs of library clientele and the public in this contemporary global digital ecosystem.

I. In the first instance, librarians through their various bodies should partner educators, stakeholders and curriculum planners as to gradually inculcate digital information literacy into the curriculum. In other words, librarians should partner all concerned entities, as by working together, schemes that highlight essential digital information literacy competencies incorporated as a compulsory course of study which will guarantee graduates that they can successfully pass through, make their own judgment and input to the global knowledge economy and information ecosystem.

II. Librarians should see it as a necessity to be conversant with technological advancement by regularly refreshing their knowledge via regular training and retraining and also through acquiring more skills and being dynamic in responding to advances in generative-AI and other emerging technologies. This is a sure way of buttressing their ability to professionally guide the intellectual community through the changing domain of generative-AI as crusaders for rectifying the ethical challenges. Furtherance, the allayed fear that the propagation of Artificial Intelligence will definitely come with it a combination of exciting opportunity and change should be discarded from the minds of librarians as with forethought, planning, and consideration of the risks, librarians can ensure they are not only prepared for the transformation that AI will bring but they also are positioned to shape and then lead the world that AI is helping to create.

III. The inculcation of digital ethics into digital literacy has great implications as far as the educational settings are concerned. To this end, there is to come up by stakeholders, a holistic plans for digital education that joins skills development with careful examinations of the moral thoughts. In all angle, librarians are seen as veritable tools in assisting both

students and educators in being aware of all ethical issues concerning generative AI and being technologically enlightened so as to effectively harness the gains of digital world.

IV. To the producers of Generative-AI and the global government, the promulgation of the desire laws has been missing despite the generative-AI discipline's unexpected progression. This implies that the enactment of approved laydown rules and acceptable ethical levels that are needed to assure the proper advancement and utilization of generative-AI and other AIs are overdue. From the look of things, it is imperative to assert there is urgent need for researchers, developers, librarians, legislators, and ethicists to work together with a view to addressing all identified ethical issues, providing rules and benchmarks for careful guided utilization of generative-AI.

V. There is also this fear, that heightened utilization of generative-AI could spearhead the propagation of disinformation and misinformation just like the general AI and will also raise some security and privacy issues. In this situation, librarians are expected to be in the forefront of ensuring the proper and guided utilization of generative AI or any other AI and also master how to know AI-generated text and images to transfer these skills and knowledge on to the library clients.

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**REFERENCES**

1. Google Cloud. (2024). *Use cases of generative AI*. https://cloud.google.com/use-cases/generative-ai
2. Froehlich, T. J. (2020). Navigating fake news, alternative facts, and misinformation in a post-truth world. In *Ethical issues in information science* (pp. 45-67). IGI Global. https://doi.org/10.4018/978-1-7998-2543-2.ch003
3. Bakare-Fatungase, O. D., Adejuwon, F. E., & Idowu-Davies, T. O. (2024). Integrating artificial intelligence in education for sustainable development. In *Using traditional design methods to enhance AI-driven decision making* (pp. 231–245). IGI Global.
4. Encyclopædia Britannica. (2024). *Artificial intelligence*. https://www.britannica.com/technology/artificial-intelligence
5. TechTarget. (2024). *How does AI work?* https://www.techtarget.com/searchenterpriseai/definition/ai
6. Nah, F. F.-H., Zheng, R., Cai, J., Siau, K., & Chen, L. (2023). Generative AI and ChatGPT: Applications, challenges, and AI-human collaboration. *Journal of Information Technology Case and Application Research, 25*(3), 277–304. https://doi.org/10.1080/15228053.2023.2233814
7. IBM. (2025). *Transformer model*. https://www.ibm.com/think/topics/transformer-model
8. Awan, A. A. (2023). *What is a generative model?* DataCamp. https://www.datacamp.com/blog/what-is-a-generative-model
9. Davenport, T. H., & Mittal, N. (2022). How generative AI is changing creative work. *Harvard Business Review*. https://hbr.org/2022/11/how-generative-ai-is-changing-creative-work

10. Lawton, G. (2023). *What is generative AI? Everything you need to know*. TechTarget. https://www.techtarget.com/searchenterpriseai/definition/generative-AI
11. Gaul, M. (2023). *Report on generative AI in education market*. MarketSearch.biz. https://www.marketsearch.biz/report/generative/ai-in-education-market
12. Neurond. (2023). *Generative AI*. https://www.neurond.com/blog/generative-ai
13. Teacher Tapp. (2023). *How to improve behaviour, wellbeing, and how you are using AI in schools*. https://www.teachertapp.co.uk/articles/how-to-improve-behaviour-wellbeing-and-how-you-are-using-ai-in-schools/
14. Ofcom. (2023). *Online nation report 2023*. https://www.ofcom.org.uk/siteassets/resources/document/research-and-data/online-research/online-nation/2023/online-nation-2023-report.pdf
15. Nguyen, T. (2024). *Generative AI in education: Benefits, barriers, and use cases*. Neurond. https://www.neurond.com/blog/generative-ai-in-education
16. Stryker, C., & Scapicchio, M. (2025). *What is generative AI?* IBM. https://www.ibm.com/think/topics/what-is-generative-ai
17. American Library Association. (2016). *Information literacy competency standards for higher education*. https://alair.ala.org/items/294803b6-2521-4a96-a044-96976239e3fb
18. UNESCO. (2023). *Information literacy*. https://www.unesco.org/en/ifap/information-literacy
19. United Nations Educational, Scientific and Cultural Organization. (2006). *Alexandria Proclamation on Information Literacy and Lifelong Learning*. https://unesdoc.unesco.org/ark:/48223/pf0000144820
20. Wikipedia. (2024). *Ethics*. https://en.wikipedia.org/wiki/Ethics
21. Encyclopædia Britannica. (2024). *Ethics*. https://www.britannica.com/topic/ethics-philosophy
22. American Library Association. (2017, January 19). *Digital literacy: Welcome to ALA's literacy clearinghouse*. https://literacy.ala.org/digital-literacy/
23. UNESCO Institute for Statistics. (2018). *A global framework of reference on digital literacy skills for Indicator 4.4.2*. https://unevoc.unesco.org/home/TVETipedia+Glossary/show=term/term=Digital+literacy
24. International Telecommunication Union. (2019). *Digital skills insights*. https://www.academy.itu.int/sites/default/files/media2/file/digital-skill-insights-2019-itu-academy.pdf
25. International Telecommunication Union. (2010). *World Telecommunication/ICT Development Report 2010: Monitoring the WSIS Targets*. https://www.itu.int/pub/D-IND-WTDR-2010
26. Brush, K. (2024). *Digital ecosystem*. TechTarget. https://www.techtarget.com/searchcio/definition/digital-ecosystem
27. Smowltech. (2024). *Digital ethics: Definition and examples*. https://smowl.net/en/blog/digital-ethics/
28. Humphreys, D., Koay, A., Desmond, D., & Mealy, E. (2024). AI hype as a cyber-security risk: The moral responsibility of implementing generative AI in business. *AI and Ethics*. https://doi.org/10.1007/s43681-024-00443-4
29. Lawton, G. (2024). *Generative AI ethics: 8 biggest concerns and risks*. TechTarget. https://www.techtarget.com/searchenterpriseai/tip/Generative-AI-ethics-8-biggest-concerns
30. Tad, N. (2023). *How to put generative AI to work responsibly*. Boston Consulting Group. https://www.bcg.com/publications/2023/responsible-ai-crucial-to-avoid-new-ai-tech-risks
31. Greenstein, B. (2022). *AIThority interview with Bret Greenstein, Partner, Cloud & Digital – Analytics Insights at PwC*. AIthority. https://aithority.com/technology/analytics/aithority-interview-with-bret-greenstein-partner-cloud-digital-analytics-insights-at-pwc/

32. Gupta, A. (2018). The evolution of fraud: Ethical implications in the age of large-scale data breaches and widespread artificial intelligence solutions deployment. *Journal of Cybersecurity Research, 3*(1), 12-25.
33. Johnson, B. (2020). Automation and its implications for social inequality. *Journal of Technology and Society, 22*(2), 59-63.
34. Li, J., & Chang, X. (2023). Combating misinformation by sharing the truth: A study on the spread of fact-checks on social media. *Information Systems Frontiers, 25*, 1479–1493. https://doi.org/10.1007/s10796-022-10296-z
35. Ferrara, E. (2024). Fairness and bias in artificial intelligence: A brief survey of sources, impacts, and mitigation strategies. *Science, 6*(1), 3. https://doi.org/10.3390/sci6010003
36. Labuz, M. (2023). Regulating deep fakes in the artificial intelligence act. *Applied Cyber and Internet Governance, 1*(1), 45-60. https://www.acigjournal.com/Regulating-Deep-Fakes-in-the-ArtificialIntelligence-Act,184302,0,2.html
37. Shahzad, K., & Khan, S. A. (2023). Effects of e-learning technologies on university librarians and libraries: A systematic literature review. *The Electronic Library, 41*(4), 528–554. https://doi.org/10.1108/EL-04-2023-0076
38. Semeler, A. R., Pinto, A. L., Koltay, T., & Rozados, H. (2024). Algorithmic literacy: Generative artificial intelligence technologies for data librarians. *Journal of Librarianship and Information Science*. https://doi.org/10.1108/EL-04-2023-0076
39. Saeidnia, H. R. (2023). Ethical artificial intelligence (AI): Confronting bias and discrimination in the library and information industry. *Library Hi Tech News, 40*(5), 1-5. https://doi.org/10.1108/LHTN-10-2023-0182
**40.** Bakare-Fatungase, O. D. (2024). *Staying ahead of the digital curve: Librarians as panacea of the G-AI conundrum* [PowerPoint slides]. Institute of African Studies, Carleton University. https://carleton.ca/qes/2024/presentation-by-dr-oluwabunmi-bakare-fatungase-at-royal-military-college-kingston/