

Emerging Smart Green Schools in Nigeria: Implications for Librarians.

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Abstract

As education is evolving in response to technological advancements and environmental concerns, the role of school librarians is updating accordingly. The new concept of smart green schools, which incorporates advanced technology and sustainable practices, require librarians to acquire additional set of skills. The objective of the paper is to identify the new roles and competences for school librarians working in smart green schools. The concept of smart green schools and librarians' involvement is presented through the review of existing literature. The study identified the competencies and skills that school librarians need in this new education landscape. It concluded that stakeholders ensuring that librarians are equipped with these skills is imperative. By imbibing these new roles librarians will contribute to creating a dynamic, tech-savvy, and sustainable climate learning landscape in Nigeria. It recommends that librarians should be open, flexible and proactive in adopting new roles for smart green school libraries. Also Library school curriculum modification across Nigeria is strongly advocated.

Keywords: *School librarians, Smart schools, Green schools, Digital schools, School libraries, Sustainable schools, Smart green schools.*

Introduction

Education worldwide, just like other spheres of endeavours is undergoing a significant transformation, driven by rapid technological advancements and a growing emphasis on environmental sustainability occasioned by the evolution of the Fourth Industrial Revolution (4IR). Smart green schools are one of those emerging concepts in education which involves a combination of the smart schools concept on one hand and green schools initiatives on the other. Smart schools could easily be defined as schools that incorporate the latest technologies to organise, accommodate and optimise the student learning process. Thus, using the 21st century easily accessible technologies, smart schools ensure that students are kept engaged at all times through the incorporation of all the technologies that can help in the management and the learning of the students (CloudNotte, 2024)

According to Omidinia, et al., (2013), smart schools are technology-based teaching-learning institutions meant to prepare children for the Information Age since they integrate new technologies into their content, organisation and management to maximise the students' learning process and experiences. These schools make use of the Internet of Things (IoT), cloud-computing, smart boards, artificial intelligence, and digital textbooks to set up an engaging and interactive educational environment. These facilitate personalised learning experiences and enhance students' outcomes (Karampa & Paraskeva, 2020; Georgescu & Popescu, 2015). It is a modern concept where technology is used to make teaching and learning better. Here technology tools like artificial intelligence, virtual reality,

and the internet are used with the ultimate goal of making students learn more effectively. Smart school education offers different services like virtual classrooms and online communication channels between students, teachers, and other helpers (ExtraMarks, 2024).

On the other hand, is the concept of green school. A green school is about more than curriculum and bricks and mortar. It's a school where everything works together to support global sustainability and climate action. It prepares students to lead the world toward a healthier, cleaner, more sustainable future (Centre for Green School, 2023). Green schools are now being integrated into regular and smart schools. Green schools are inclusive, climate-friendly schools designed to produce healthy students and communities through sustainable environmental management literacy and practices, incorporated into regular school programmes. They represent a vision for a more sustainable, healthier, and enlightened future, where education and environmental preservation go hand in hand, inspiring a new generation of environmentally conscious citizens.

Green schools are springing up around the world because of their benefits which promise to: improve and protect health, reduce carbon emissions, improve students' performance, create green jobs, improve indoor air, employ day lighting strategies and improve classroom acoustics quality while saving both energy and money (Boston Public Schools, 2024). The fundamental idea behind the green school is the imbibing of environmentally friendly habits into the young ones through practical education. It has emphases on hand-on activities to form part of their lifestyle for a healthy and sustainable future. For instance, it is intended that the home economics laboratories will get supplies from the students' farms and gardens. Students will have outdoor classes, garden, compost, and learn how to separate and recycle garbage. They should have projects to care for the school's animals and plants. This should start with clear climate friendly architectural designs and heavily green and natural landscapes to be powered by clean and renewable energy, particularly solar. Such a school environment shall be constructed with low-carbon and recycled materials with availability of clean water, which helps the children imbibe best hygiene and sanitation practices early in life. These dimensions inform the school librarians' vision for resource development and 'green library' activities. Libraries that conform to sustainability practices are regarded as green libraries and are recommended for school libraries.

The International Federation of Library Associations and Institutions (IFLA) succinctly defines and explains green and sustainable library as one that takes into account environmental, economic and social sustainability with the following clear agenda:

1. Green buildings and equipment: the emissions, or carbon footprint, of the building and equipment should be reduced.
2. Green office principles: environmental sustainability of routine operations and processes.
3. Sustainable economy: consumption is restrained, and circular, and sharing economy practices are advanced and are made accessible to the community.
4. Sustainable library services: relevant and current information is easy to access for users, shared spaces, devices, and environmental education is offered, and operations are efficient. The library has a positive carbon handprint.

5. Social sustainability: Good education, literacy, community engagement, cross-cultural diversity, social inclusion, and overall participation are considered. The library works actively to reduce inequality.
6. Environmental management: ensuring that environmental goals are specific, measurable, achievable, realistic and time bound (SMART). The library's environmental policy, its implementation and the results from such works are communicated to the community.
7. Commitment to general environmental goals and programmes: activities should be guided by the UN Sustainable Development Goals, the Paris Climate Agreement and related environmental certificates and programmes.

The fusion of green and smart schools produces the ideal institution for this generation. They are preferably called "Smart Green Schools". They are also interchangeably called smart schools, digital schools, green schools or sustainable schools. By whatever name the proprietors call them, 'these schools are systematically composed of physical place, educational programmes and organisational culture' (Centre for Green Schools, 2023). The activation of each of these components makes these digital schools whole and sustainable. Green schools emphasizes eco-literacy, human health, and environmental impact, while smart schools focus on the integration of advanced technologies and pedagogical innovations into the learning environment. It is all about improving educational content and format to sustain the earth.

According to the Melbourne School of Design (MSD, 2007), concurrently, education is changing from classrooms into learning environments and informational environments. Schools cannot be green without being smart and can't be smart without being green. It is then necessary to bring environmental and educational imperatives together in innovative ways. This signals a marked departure from the normal school system starting from physical configuration to instructional format and content, all targeting a sustainable healthier future. Typically, smart green schools take care of nursery/ primary schools students and up to junior secondary schools in Nigeria. New smart green schools are sprouting up, while existing schools are being remodeled and transformed to conform to the trend. This does not however exclude the greening of higher institutions in Nigeria by concerned authorities, as some green universities are already flourishing in other countries.

The contrasts between conventional schools and smart green schools are enormous with multiple implications for librarians. Now, the traditional old school methods of organisation, administration and practices are giving way to emerging dynamic methods which has found expression in smart green schools. The use of pens and notebooks is giving way to tablets and computers; the use of ledgers and cumbersome paper works is yielding to all-in-one management soft wares; teacher-centered mode is giving way to student-centered mode; static black and white boards are being replaced by activated interactive classrooms (CloudNotte, 2024) and dry, dusty and mostly unhealthy school environment is being taken over by green, clean and healthy landscapes. This departure from the old school pattern to the sustainable new, implies a shift for library practices and standards. This transformation affects the physical, content and format of the school library.

Central to the functioning of smart green schools is the role of smart librarians, whose responsibilities have evolved from traditional book management to becoming tech-savvy and versatile information specialists. Smart librarians utilise digital catalogues, e-books, and sophisticated library management systems to support both students and teachers in navigating the e-resources. Here they have to operate libraries that are technology and climate sensitive. These are sometimes called green libraries. Their role is crucial in fostering digital literacy, managing educational data, and ensuring that both students and the entire school community can efficiently access and use information.

It is of utmost importance that Nigeria joins the crop of nations proudly instituting smart green schools. This paper explores the concept of smart green schools and highlights the evolving functions for school librarians in Nigeria today under the following headings: State of the literature; UNESCO Initiatives on “Greening Education”; Enugu State’s Smart and Green Schools Initiatives; the New Roles and Competencies of School Librarians; Conclusion and Recommendations.

State of the Literature

According to UNESCO (2024) a “green school” is defined as a learning institution that takes a whole-of-institution approach to Education for Sustainable Development (ESD), in particular by addressing climate change through its teaching, facilities and operations, school governance, and community partnerships. Green schools aim to promote knowledge and skills for the social, economic, cultural, and environmental aspects of sustainable development. Mogas et al., (2022) undertook an empirical study of emerging smart schools in which web-based cyber-physical environments will shape future learning environments. The study intended to get a deeper knowledge of how schools are approaching the upcoming transformation occasioned by the advent of the Fourth Industrial Revolution. The setting was in Catalonia, where 37 primary and secondary school principals were interviewed. From their results several of the schools considered themselves green schools and exhibit environmental practices, but sustainability was in question. Conclusions were drawn to show that, although schools were not yet prepared to cope with the Fourth Industrial Revolution, its impact relies on the technology’s level of maturity and ease of use, as well as stakeholders as policymakers.

Another interesting article which made a fundamental input to the concept of smart schools was written by Zhu, et al, (2016). It dealt on the research framework of smart education. The paper discussed the definition of smart education and presented a conceptual framework. It was a four-tier framework of smart pedagogies with ten key features of smart learning environments. This they proposed for foster smart learners who need master knowledge and skills of the 21st century learning. The smart pedagogy framework included class-based differentiated instruction, group-based collaborative learning, individual-based personalised learning and mass-based generative learning. It also proposed a technological architecture of smart education, which emphasises the role of smart computing. The paper concluded by discussing the challenges of smart education.

Greenfield (2023) viewed green schools as educational institutions that prioritise environmental responsibility, sustainability, and health and wellness within their design, construction, and operation. They are built and operated with a focus on

minimising their negative impact on the environment and promoting a more sustainable, healthy, and environmentally conscious lifestyle. The Role of Green Libraries in Promoting Eco-friendly Reading Spaces in Nigeria was the title of a book chapter written by Enang and Kolawole (2024). This article examined the critical role that green libraries can play in promoting eco-friendly reading spaces in Nigeria. It looked at the many advantages of incorporating sustainable practices into the layout and functioning of libraries, emphasising the need for these kinds of projects in light of Nigeria's urgent environmental problems. By examining important aspects such as the choice of site selection, building materials, energy conservation, water conservation, and air quality. It underscored the transformative potential of green libraries in promoting environmental stewardship, community well-being, and sustainable development. It also addressed the challenges of starting and keeping green libraries in Nigeria and provides workable answers to these challenges. It advocated for the widespread adoption of green library policies as a catalyst for positive change in Nigeria's library sector. This idea of green libraries as propounded by the authors mirrored the model libraries needed for smart green schools.

The American Library Association (ALA, 2024) believes in and promotes sustainability as a core value of librarianship. Through its resolutions, policies and guidelines on sustainability, the Association is supporting librarians in the provision of rigorous, robust, and accurate information on the condition of the earth, its air, ground, water, and living organisms from all available sources. ALA is working for the 'greening of libraries' in America and around the world, with emphasis on practical efforts at reducing carbon footprints.

Nigeria is already lagging behind on the burning issue of greening libraries and schools from primary to the universities for environmental sustainability. Green libraries have been the policy and practice of many institutions in other countries. This was the focus of a study by Oyelude, A and Alabi, A. (2013) titled: Greening: Pluses and Minuses of Nigerian Libraries in Promoting Environmental Sustainability. The research aimed at examining green initiatives within Nigerian libraries with emphasis on analysis of related policy and practice of green librarianship, and the place of Nigerian libraries in the green initiatives. It sought to investigate the level of awareness of librarians of greening, attitude to greening libraries, efforts at greening libraries, greening policy in the libraries and ways of further advancing greening for sustainable development. They used mixed methods of literature search, interview, participant observation and survey questionnaire for data collection. The findings revealed that the level of awareness of greening initiatives among Nigerian librarians is still relatively low, despite the heating greening activities around the world. They recommended increased awareness and environmental literacy among library users and the entire community to build better green momentum in Nigerian libraries. This study contributes to the body of literature on smart green schools' development and management in Nigeria, which is presently scanty.

UNESCO Initiatives on “Greening Education”

In support of green schools globally, the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2024) has launched new initiatives for “greening education” in classrooms. It states that greening schools and curricula is one of the best weapons to tackle climate disruption in the long-term. It projects

the need to mainstream environmental education across school subjects, at all levels of education with an action-oriented approach that helps young people understand their power to make a difference. Following this, UNESCO made environmental education a priority in terms of the support which it provides to Member States. It also leads the Greening Education Partnership that more than 80 Member States have now joined and enables collaboration between more than 1,300 organisations, including UN agencies, civil society and youth organisations, as well as the private sector. This community provides countries with essential tools for strengthening the role of education in tackling climate issues. For purposes of uniformity, consistency and effectiveness, UNESCO also developed a practical manual on Greening Curriculum Guidance and Green School Quality Standards, which specifies the minimum requirements on how to create a “green school”. It is its vision that at least 50% of schools in every country will be ‘greened’ by 2030.

Following the UNESCO promptings, several nations across the globe have adopted various approaches in implementing smart green schools, based on their unique educational goals and technological capabilities. Prominent among the countries already implementing smart green schools and some of their objectives are:

1. Australia focuses on building a multidisciplinary, student-centric education system through adaptive learning programs, digital resources, and online learning tools. This is to enhance both student and teacher experiences (New York Smart Schools Commission Report, 2014).
2. The Malaysian Smart School initiative focuses on fostering 21st-century skills through the integration of cutting-edge technologies to stimulate creativity, critical thinking, and personalised learning experiences (Noh et al., 2011).
3. Singapore's smart education model emphasises the use of ICT to create engaging and personalised learning environments. Their strategy includes the development of a nationwide educational infrastructure to support lifelong learning (Education and Learning Sub-Committee, 2007).
4. The United Arab Emirates aims to advance its education system by applying world-class teaching methods using the latest technologies. They adopt fostering creativity, analytical thinking, and innovation among students (Kankaanranta & Mäkelä, 2014).
5. Korea's smart education project provides customised and adaptive learning experiences to develop self-directed learning abilities. The initiative includes individualised instruction and creativity-centred education (Spector, 2014).

School Librarians are expected to be in the management team of each and every one of these innovative schools.

Here in Nigeria, the Federal Government in partnership with a Chinese firm called NetDragon announced its intention to establish what it termed “smart learning classrooms” across the country (Akeregha, 2018). This was in August 2018. In the pilot phase of this project the partnership was to provide “smart classrooms” to Pilot Nursery/Primary Schools in the Federal Capital Territory. There is no more literature on the progress of this pilot project or its extension across the country or any other attempt at the establishment of Smart green schools in Nigeria. But in the Eastern region of the country Enugu State had taken up the challenge.

Enugu State's Smart and Green School Initiative

UNESCO encourages national governments to support at least half of the country's schools to become green climate-ready schools using the standard. Many countries are already integrating climate change issues in education. Here in Nigeria, Enugu State seems to be at the forefront. For a start, it is embarking on the establishment of 260 Smart Green, integrated schools strategically placed in each political ward. It is designed to accommodate pre-primary to junior secondary levels. This vision of sustainability goes beyond infrastructure as these schools exemplify a circular economy, constructed with low-carbon and recycled materials. They are powered by clean and renewable energy, particularly solar. The experiential learning programs, including "School Gardens and Farming Clubs", align with the United Nations Sustainable Development Goals. With these values of environmental stewardship, civic responsibility, resource management, and climate action will be instilled in the students. For what it called multimedia hybrid libraries the Enugu State Commissioner for Education had advertised for applications for Librarians. The qualifications include PhD in Library and Information Science. The application opened from May 24th - 27th, 2024. This marks the beginning of more vacancy publications like this for school librarians to work in Smart Green Schools in Nigeria and so professionals are expected to be very ready!.

The key roles and expectations from librarians in smart green schools

In running green libraries in schools, librarians should first be guided by IFLA ENSULIB Section prescriptions which takes into account the sustainable principles into the environmental, economic and social aspects of the green library development. Specifically, School librarians are expected to be involved in:

1. **Promoting Green Spaces:** Starting from the physical, Librarians should transform library spaces into eco-friendly zones. They should cultivate a green environment with a variety of trees, shrubs and rich gardens. Such green library landscapes can be very inspiring for outdoor reading by students. Within and outside the library also, the librarians should promote energy-efficient lighting, recycling, and sustainable materials for furniture and displays.
2. **Acquisition of Sustainable Resources:** Librarians select, procure and manage both physical and digital resources that comply with sustainability goals. It starts with curating eco-friendly books, e-books, online databases and other innovative curriculum -supported resources for students and teachers.
3. **Collaborating with Teachers:** Librarians work closely with educators to integrate green practices into the curriculum. They assist in designing lessons that emphasises environmental awareness and responsible technology use.
4. **Promoting Environmental Literacy and sustainability:** Green schools are about environment- compliant education. Therefore, educating students about environmental issues, climate change, and conservation is a duty for the Librarian. They organise workshops, book displays, and discussions on sustainability topics. They should practically model sustainable habits within the library, such as reducing waste and conserving energy, thereby supporting the school's overall green initiatives.
5. **Training in digital Literacy:** Librarians should teach students how to critically evaluate online information, with emphasis on reliable sources related to sustainability. They guide students in using technology for research and learning from the early age.

6. Partnership with Community; Engaging with the community is essential for librarians in smart and green schools. They should grow partnerships with local organisations, libraries, and environmental groups and farms to enrich the school's educational resources and programs. This includes collaborative projects that bring together students, teachers, and parents. These collaborations can provide students with real-world learning opportunities and enhance the library's role as a community hub.
7. Collaboration and Instructional Leadership: Librarians serve as instructional leaders and collaborators within the educational ecosystem. They work closely with teachers to integrate information literacy into the curriculum, design collaborative projects, and support inquiry-based learning. This collaboration ensures that the resources are age-appropriate and aligned with the educational goals of the smart and green schools. This also includes facilitating professional development for educators, helping them stay abreast of technological advancements and innovative teaching strategies
8. Information Literacy and Management: Effective information management is crucial for librarians in smart and green schools. They must guide students in navigating vast amounts of digital information, ensuring the development of critical thinking and information literacy skills. This involves teaching students how to evaluate the credibility of sources, synthesise information, and ethically use digital content.
9. Sustainability and Green Practices: Librarians in smart and green schools are also expected to promote and implement sustainable practices. This includes managing digital resources in an environmentally responsible manner and advocating for green policies within the school library. The integration of green practices not only supports environmental sustainability but also educates students about the importance of ecological responsibility.
10. Personalised librarianship: Following on the smart green school focus on student-centred learning, librarians should also practice special attention to each reader to meet up with their peculiarities.
11. Leadership in environmental education: School Librarians should be at the forefront of advocating and domesticating sustainable practices for the teachers, the students and the entire community.

Critical competencies for librarians in Smart Green schools

The integration of smart and green models in educational environments, implies additional competencies of school librarians. This shift is vital to meet the evolving demands of information management, digital literacy, technology facilitation and climate literacy. Therefore, meeting up with expected functions and following trends in smart and green schools' education requires new skills including:

1. Technological Proficiency

It is paramount that librarians in smart green schools must exhibit high levels of technological proficiency. This includes familiarity with digital tools, online resources, and educational technologies that facilitate interactive and personalised learning experiences. Smart librarians should be adept in using and teaching with digital platforms, ensuring that they can support both students and educators in a tech-driven educational landscape.

2. Information and Technology Management

Effective management of digital information and technology is critical in smart schools. Librarians must possess advanced skills in managing digital collections,

utilising library management systems, and ensuring cyber security. This highlights the importance of continuous professional development in these areas to keep pace with technological advancements and changing educational needs

3. Environmental literacy

Not being a part of their professional training and practice, smart librarians should educate and upgrade their knowledge of climate issues for a sustainable future. They should be conversant with UNESCO's guidelines for green schools and IFLA's policies. These are meant to systematically culminate in enhanced student well-being, academic performance, and ecological awareness. It will also inform their collection development and practices.

These fresh roles and competencies are only additions to the basic known fundamental functions and values of school librarians including: evaluation of resources, acquisition and organisation, information management and retrieval, promoting digital literacy including responsible internet practices, instituting up-to-date library management and operations systems. ensuring data analysis and reporting, enhancing reading culture and trending technology and media literacy education.

Conclusion

The competencies required for librarians in smart green schools are multifaceted, encompassing technological proficiency, information literacy, instructional leadership, environmental literacy, and community engagement. Addressing the challenges through continuous professional development and fostering a culture of adaptability will ensure that librarians can effectively support and enhance these innovative educational environments. By staying at the forefront of technological and environmental advancements, librarians not only contribute to the academic success of students but also play a pivotal role in shaping a sustainable future. In Nigeria, smart green schools are gradually sprouting up, and the pioneer librarians to take up the jobs should act proactively.

Recommendations

1. Existing and prospective school librarians should engage in continuing education programmes to up skill for a smart green school environment.
2. The Association of School Libraries in Nigeria should prioritise advocacy at all levels for the domestication of UNESCO Smart Green schools policy in Nigeria.
3. Training and retraining of school librarians with IFLA Smart Green schools agenda should be programmed by the Association of School Libraries along with other stakeholders.
4. The Nigerian Library Association (NLA) should through NUC alert the Library schools in the higher institutions of the need to include smart green school operations in the graduate and undergraduate curriculum.

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