ASSESSMENT OF LIBRARY SCIENCE AND TECHNOLOGY AS A PANACEA FOR EFFECTIVE TEACHING SCIENCE SUBJECTS

Essien Edem UDO, *Ph.D*
Science Education Department
Faculty of Education
University of Uyo, Uyo

AND

JACKSON, Glory Jackson
Institute of Education and Professional Development
Facility of Education
University of Uyo

ABSTRACT

The study aimed to analyze library science and technology as a panacea for effective teaching science subjects. A library is a place set apart to contain books, periodicals, and other material for reading, viewing, listening, study, or reference, as a room, set of rooms, or building where books may be read or borrowed. Libraries, for example, play a number of roles in the educational ecosystem, including promoting reading and lifelong learning, providing access to relevant and up-to-date research information, developing information literacy skills, and providing training and support for students' learning needs through a variety of mechanisms. Library science plays an important role in ensuring effective teaching and learning of science subject, in many Nigerian schools and institutions of higher learning, libraries have remained underappreciated reading centers, and their contributions are undervalued. The study assess the concept of library science, library technology, effective teaching and the roles of library science and provision of instructional materials for in effective teaching of science subjects. It was on this basis that the study concluded that libraries are not only a key factor in restoring quality teaching and learning, but they are also a necessity for the effective teaching of science subject. Library science plays a number of roles in the educational ecosystem, including promoting, reading lifelong learning, and providing access to relevant and up-to-date research information, developing information literacy skills, and providing training and support for students' learning needs through a variety of mechanisms. One of the recommendations made was that there is need to incorporate library science and technology as a specialization in Nigerian library school curriculum.

KEYWORDS: Library Science and Technology Effective Teaching, Librarians, Science Teachers and Akwa Ibom State

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

Introduction

The library is the hub of academic institutions because it offers the environment and resources required for studying, teaching, and doing research. Learning, teaching, and research are essential activities carried out in any academic setting where the library's content is available. Therefore, it is obvious that libraries have a part to play in the advancement of education. Because they offer a space for teachers and staff to do research and further their knowledge, academic libraries have been referred to as the heart of the institution. In order to serve the academic and research community, a library's primary function is to gather, process, store, and disseminate information (Agyen-Gyasi, Lamptey, & Frempong, n.d.). Given that it is necessary for all phases of human development, information is currently regarded as the fifth factor in production. People require knowledge to complete their course or academic requirements as well as to develop new abilities. Maximizing the intense use of a library's information resources and services is one of its main goals. In order to justify the enormous sum of money invested in such resources, library contents must be utilized effectively (Agyen-Gyasi, Lamptey, & Frempong, n.d.).

The choice of instructional resources that satisfy student demands and adhere to the limitations of the teaching and learning environment is a crucial component of effective teaching. A potent method for ensuring that science is taught and learned effectively is the use of instructional materials. Through their efficient use in classroom education, instructional materials can be used to demonstrate the significance of quality and adequate materials in teaching and learning. All the resources that teachers can utilize to make learning more engaging and memorable are included in the instructional materials here. The success with which an academic library is able to offer the user pertinent material determines how effective it is as a tool for learning. The success of a library was traditionally evaluated in terms of its balanced and comprehensive holdings, as well as its cataloging and acquisition processes. The opposite end of the knowledge transmission process has recently come into emphasis. The function of the academic library is evolving with the introduction of online catalogs, online databases, and other electronic resources (CD-ROM), access to information, and new techniques for document delivery. Users can access the library's resources even if they are not physically present there (Agyen-Gyasi, Lamptey, & Frempong, n.d.). In essence, the library offers the knowledge required for pupils to be properly educated in the processing, absorption, and usage of knowledge. The fundamental goal of general education is to design and direct reforms that will transform a country into a strong and vibrant knowledge economy, along with the fundamental concepts of e-learning technology and its applications to user education using software and hardware requirements (Kattimani & Naik, 2012).

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

Concept of Library

A library is a location where books, papers, recordings, videos, and other reference materials are stored for use only; they are not for sale. Any evaluation endeavor requires an understanding of the goals and nature of a library. According to Cossette (2011), the purpose of a library is to share knowledge with its users through the collection, organization, retrieval, and dissemination of recorded information. Such a system pursues goals in the documentation field specifically that are in line with the information needs of its consumers. A library is a room, series of rooms, or building where books can be read or borrowed. It is designated to house books, periodicals, and other materials for reading, viewing, listening, studying, or referencing (Dictionary, 2022). Additionally, it is a collection of written works, printed works, and other resources for viewing, hearing, studying, or referring. A library is a collection of data, sources, tools, and services that is arranged for usage and kept up by a public entity, a private entity, or both. A collection of books is what it refers to in its more conventional sense (New World Encyclopedia, 2022). People who don't want to or can't afford to buy a sizable collection for themselves, who need materials that no one can possibly be expected to possess, or who need expert support with their research, use this collection and services. The word "library" has taken on a secondary meaning that refers to a collection of practical resources for everyday use. This definition is used in disciplines including computer science, mathematics and statistics, electronics, and biology.

A library is a collection of materials, books, or media that are accessible for use and not just for display purposes. A library is a physical location or a virtual space that provides physical (hard copies) or digital access (soft copies) to materials. A library's collection can include printed materials and other physical resources in many formats such as DVD, CD, and cassette, as well as access to information, music, or other content held in bibliographic databases (Wikipedia, 2021). Libraries have been around for a very long time and have traditionally been seen as collections of information and services. Libraries have always played a significant role in enabling people to engage with all kinds of information and knowledge resources (Curran, Murray, Norrby, & Christian, 2006). Through the technological development of electronic resources, the means to collect, store, manage, and use widely distributed knowledge resources have become more effective, serving library users even better. However, the word 'library' is derived from the Latin word "libraria", meaning "a book place". It originates from the term "liber," which means "a book". According to Eberhart (2010), a library is a collection of formats that are organized by information professionals or other experts who provide convenient physical, digital, bibliographic, or intellectual access and offer targeted services and programs with the mission of educating, informing, or entertaining a variety of audiences with the goal of stimulating individual learning and advancing society as a whole.

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

Concept of Science Teacher

A person who is equipped with the required scientific and technological information, abilities, skills, and environmental conditions for realizing his full potential is a science teacher. A good science teacher, according to Menyeh (2009), must be adequately qualified to teach science, have enough training in the subject, and understand the scientific method. The science teachers should be able to explain scientific ideas in the subject matter they are claiming to teach. Teaching science in a style that combines effective communication, self-assurance, and a willingness to try anything to make a fact or principle memorable is one of the most satisfying aspects of the job. Future generations will be educated by science professors. They include a wide range of subjects, including chemistry, physics, biological science, earth sciences, and basic sciences. A science teacher offers education and direction to aid students in exploring and comprehending key scientific principles, including how to solve problems and compile evidence to back up claims or conclusions. Lesson plans are written by scientific teachers, who also conduct experiments and offer homework. To encourage fundamental comprehension and curiosity in their students, science teachers at the elementary school level concentrate on general science themes.

Science teachers typically focus on one subject in middle and high school, such as biology, chemistry, or physics, and instruct pupils on both the fundamental and more complex ideas related to that subject. A science teacher's responsibilities include developing interesting and simple lesson plans, assigning homework, giving tests, and recording grades for report cards. Particularly in the fields of information technology, biotechnology, new materials technology, new energy and renewable energy technology, advanced manufacturing technology, aerospace technology, ocean technology, and environmental technology, rapid advances in science education have played a very important role in promoting the implementation of sustainable development strategies. These fields have also provided effective ways to alleviate resource shortages and stop environmental degradation.

Concept of Library Science

The study of themes relating to libraries, the gathering, organizing, preserving, and disseminating of information resources, as well as the political economics of information, is done through the interdisciplinary field of library science, which also incorporates the humanities, law, and applied science. In the past, archival science was also a part of library science (Augusta, 2011). "A library and an archive are two distinct types of information sources. This covers a variety of topics, such as how information resources are arranged to cater to the needs of specific user groups, how users interact with technology and classification systems, how people acquire, evaluate, and apply information both

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

inside and outside of libraries, as well as across cultural boundaries, how people are trained and educated for careers in libraries, the moral principles that guide library service and organization, the legal standing of libraries and information resources, and the applied sciences. According to the New World Encyclopedia (2022), collection management, information systems and technology, cataloging and categorization, preservation, reference, statistics, and management are common topics covered in academic library science courses.

Database management, information architecture, and knowledge management, for instance, are novel issues that library science is continually adopting. Between library science, library and information science, and librarianship, there is no universally accepted division. They may have been used to raise the "science" component or enhance the public perception of librarians, but they can be viewed as comparable phrases to some extent. A wide range of institutions and organizations, as well as individuals, were able to conduct their own searches for information without the assistance of a library or library staff in the 20th century thanks to advancements in the methods of collecting, organizing, and retrieving information. University graduate programs in library science and information science started to merge the two fields as a result (Bopp, 2011). The most common degree offered by these programs is a master's, though they also occasionally award doctorates. From school to school, there are differences in the specifics of entrance and course requirements.

Concept of Library Technology

The term "library technology" has a wide range of applications. It could be related to linked-open data, RFID (radio frequency identification), digital photos or the scanners used to create them, online catalogs, long-term archiving, or digital photographs. Digital libraries and library technology are related. It must be distinguished, though. As a result of its frequent use in computer science, the term "digital libraries" is deceptive when used to describe library technology. Cultural heritage materials in digital libraries are a more direct reference to library technology. There are computer scientists engaged in libraries as well as librarians who work on the subject of digital libraries (Horstmann, 2022). As a result, there is a connection between library technology and digital libraries. The definition of library technology, on the other hand, is more precise: it is the use of technology to run a library as an institution with a physical presence. Generic technology, such as RFID, which was not created by or for libraries particularly, is used in some libraries.

As contextual library technologies, these technologies fit that description. Then there are technologies that have been specially developed for libraries and are referred to as genuine library technology." To accomplish a library's goal as an institution, true library technology is required and specially designed. The purpose of a library, as it is pragmatically defined in this literature, is to promote

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

the circulation of knowledge resources through a continuous network of individuals, physical locations, objects, and digital tools. In contrast to the rather traditional image that libraries are associated with, OPACS are early examples of enterprise systems, often established before other enterprise systems (for finance or fac). OPACS are probably the most iconic tool in libraries, and they transformed from being a physical device to being library technology in the 1970s and 1980s.

Concept of Effective Teaching

The skills, plans, methods, and conduct of effective teachers are those that result in positive student results. Effective educators make a favorable impression on their pupils and apply their knowledge to enhance learning. Most frequently, summative evaluation is used to quantify these positive outcomes as it is the most straightforward method. It's crucial to keep in mind, though, that not all components of good teaching are immediately apparent or quantifiable. Effective educators foster positive working connections with their pupils in a climate of safety and respect. Effective teaching is a continuous, reflective activity that must be improved and altered to meet the needs of students. It is much more than the statistics collected at the end of the school year. Effective teachers foster effective students who take an active role in their own education and growth. They may control a classroom to get rid of or lessen challenging behaviors, teach new material in an interesting and understandable way, and pique students' interest in the subject to encourage higher-order thinking. In order to promote high-quality learning, effective instructors must also be passionate about their topic and make use of their expertise and pedagogical skills (Hawthorne, 2022). Students who get effective instruction are able to accomplish their academic and personal objectives. Effective instructors may have a significant impact on many young people, giving them security and clarity just when they need it. Children who feel comfortable, appreciated, and part of the school community will learn more effectively and help build the culture by modeling good attitudes and behaviors. A significant influence on student success may also be made through effective instruction.

More individualized learning opportunities and better-focused evaluation are produced as a result of improved interactions with students. Schools must provide instructors with the information and skills they require to facilitate effective learning. We are aware that chances for consistent, pertinent professional growth may have an impact on much more than student achievement. A stronger emphasis on continuous professional development is among the suggestions made by the government in a report on teacher retention, which also includes other findings. The ability to provide instructions to a variety of students of varying abilities while including instructional objectives and determining the learner's most successful learning mode is the mark of an excellent teacher. Effective teaching is thus defined as the capacity to raise

INTERCONTINENTAL ACADEMIC JOURNAL OF LIBRARY AND INFORMATION SCIENCE, VOL 5 NO 1, APRIL 2023, GERMANY. ISSN (P): 2659-1072, ISSN (E): 2659-1074

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

student achievement. Effective instruction must be provided daily in every classroom and school if students are to succeed, not only on occasion. The intellectual, physical, emotional, social, and behavioral wellbeing of kids is impacted by effective teaching.

Roles of Library Science and Provision of Instructional Materials for Effective Teaching of Science Subjects

Due to the aforementioned contribution, libraries are not only essential to restoring high standards of teaching and learning, but they are also a need. Libraries have remained unrecognized reading centers, and their contributions are underestimated, despite the vital role they play in guaranteeing successful teaching and learning activities in many Nigerian schools and institutes of higher learning. Part of this is attributable to a misconception about libraries as important participants in enhancing education for long-term progress. It would be helpful to be aware of the roles that libraries play in restoring high-quality instruction in science and science-related disciplines and courses for sustainable development. The choice of instructional resources that satisfy student demands and adhere to the limitations of the teaching and learning environment is a crucial component of effective teaching. A potent method for ensuring that science is taught and learned well is the use of instructional materials. Through their efficient use in classroom education, instructional materials may be used to demonstrate the significance of quality and adequate materials in teaching and learning. All the resources that instructors may utilize to make learning more engaging and memorable are included in the instructional materials here. Ndung. (2018) claims that educational technology hardware, software, and books are all examples of instructional resources. According to him, the availability, appropriateness, and relevance of teaching materials in classrooms may affect how well science is taught, which can benefit students' learning and academic success.

Over the years, libraries have made a significant contribution to promoting education. Libraries, for instance, play a variety of roles in the educational ecosystem, such as fostering a love of reading and lifelong learning, providing access to current and relevant research information, fostering the development of information literacy skills, and meeting the training and support needs of students through a range of channels. Many people view libraries as educational establishments that promote self-actualization (Mason, 2010). According to Nworie, Obiyan, Nworie, and Irunebo (2018), libraries play a critical role in the effective teaching of science subjects by providing the necessary instructional resources. Ndung'u & Otike (2018) continue by stating that by offering information, libraries aid people in their fight against illiteracy, poverty, and hardship. Additionally, academic libraries are frequently recognized as significant forces in the development of a nation's human capital (Okiy, 2010). The value of libraries in an educational setting has been stressed by many

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

scholars. No meaningful or true education can occur without the library, claims Uziogwe (2018). Libraries are crucial for helping students think critically and do independent research, according to Kamau, Kiplang'at, and Odini (2016). Higher education institutions all around the world are presently spending a lot of money on it as a result. To assist them in achieving their goals, to ensure that users may use learning materials for scientific teaching, learning, and research, the institutions invest in them (both online and in print). When parents, lawmakers, community members, and educators all share responsibility for ongoing improvement and student accomplishment, effective teaching is most likely to occur. The most effective strategy to encourage ongoing teaching improvement for teachers in classrooms is through good professional learning. A clear vision for successful teaching and learning leads to consistently excellent scientific instruction every day, in every classroom, and in every school.

Other Roles of Library Science

Through the provision of instructional resources, information, and referral services, libraries have aided educational endeavors. Libraries play a useful role in sharing costly resources. A community of users shares physical resources, including books, journals, movies, videos, software, electronic databases, and specialized instruments like projectors, graphics equipment, and cameras. Librarians in human resources, often known as media experts or information specialists, assist educational programs by initiating activities for teachers and students as well as responding to teacher and student requests (responsive service). Maintaining reserve items, responding to reference inquiries, giving bibliographic guidance, creating media packages, suggesting books or movies, and instructing users on how to utilize materials are all examples of responsive services (Herman, 2019). Initiating theme events, working with instructors to prepare instruction, selectively disseminating information to staff and students, and introducing new teaching strategies and resources are examples of proactive services. Libraries help professors and students share expensive resources and knowledge in various ways. Libraries preserve and arrange ideas and artifacts with a cultural purpose. The best pieces of science, literature, and art must be preserved and made available to future generations of students. Primary and secondary school libraries frequently double as museums and labs, despite the fact that they have historically been thought of as storage spaces for printed materials. Libraries protect items by using cautious storage techniques, rules for borrowing and using them, and doing necessary repairs and upkeep. Libraries provide access to resources in addition to preserving them by providing finding aids like catalogs, indexes, and other tools that help students discover the materials they need.

When it comes to bringing people and ideas together, libraries serve both social and intellectual functions. This differs from the practical function of sharing resources in that libraries offer a physical location for teachers and

INTERCONTINENTAL ACADEMIC JOURNAL OF LIBRARY AND INFORMATION SCIENCE, VOL 5 NO 1, APRIL 2023, GERMANY. ISSN (P): 2659-1072, ISSN (E): 2659-1074

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

students to gather outside of the confines of the classroom. This enables people with various viewpoints to interact in a knowledge space that is both larger and more general than that shared by any particular discipline or affinity group (Herman, 2019). For those doing specialized research, browsing a library catalog offers a broad perspective and the opportunity for serendipitous ideas or alternate viewpoints. In many ways, libraries act as hubs for interdisciplinary learning environments that are accessible to students from various academic fields. By enabling access to a variety of information resources outside of the physical area shared by learning communities, digital libraries enhance this multidisciplinary approach. The ability of digital libraries to connect individuals with academic, casual, and professional learning goals is one of their biggest advantages.

Conclusion

The study concludes that libraries are not only a key factor in restoring quality teaching and learning, but they are also a necessity for the effective teaching of science subjects. Library science plays a number of roles in the educational ecosystem, including promoting lifelong learning, providing access to relevant and up-to-date research information, developing information literacy skills, and providing training and support for students' learning needs through a variety of mechanisms.

Recommendations

1. There is a need to incorporate library science and technology as a specialization in the Nigerian library school curriculum.

2. More generous financial support should be made available to provide the basic ICT infrastructure facilities in the library for effective teaching.

3. Science teachers, librarians, parents, policymakers, community members, and educators, should share the responsibility of effective teaching for continuous improvement and student achievement.

INTERCONTINENTAL ACADEMIC JOURNAL OF LIBRARY AND INFORMATION SCIENCE, VOL 5 NO 1, APRIL 2023, GERMANY. ISSN (P): 2659-1072, ISSN (E): 2659-1074

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

REFERENCES

Agyen-Gyasi, K., Lamptey, R. and Frempong, A. (n.d). *Academic Librarians' Role in Maximizing Library Use in Ghana*. Available at: http://hdl.handle.net/123456789/561

Augusta B. (2017). *library science.* Available at: https://www .britannica. com/ biography/Augusta-Braxton-Baker

Bopp, R. & Linda C. Smith. (2011). *Reference and Information Services: An Introduction.* Library and information science text series. Englewood, Colo: Libraries Unlimited.

Cossette, A. (2011). *Evaluating the effectiveness of a library: a theoretical and methodological framework.* Retrieved from: http://www.nzdl.org/cgi-bin/library?

Curran, K., Murray, M., Norrby, D. & Christian, M. (2006), Involving the user Through Library 2.0. *New Review of Information Networking,* 2 (1), Pp. 47–59

Dictionary (2022). Concept of Library. Available at: https://www.dictionary.com/browse/library

Eberhart, G. M. (2010). A Review of the Librarian's Book of Lists. Internet Reference Services Quarterly.15(4).

Hawthorne, H. (2022) What is Effective Teaching? Available at: https://www. highspeedtraining. co.uk/ hub/ what-is -effective-teaching/#

Herman M. (2019). *The roles of digital libraries in teaching and learning.* Available at: https://ils.unc.edu/~march/cacm95/main.html

Horstmann W. (2022). *Library technology* – between local tools and global solution. Available AT: https://www.degruyter.com/document/doi/10.1515/bfp-2022-0011/html?lang=en

Jebako, F. (2020). *Effective Teaching.* Retrieve From: https://medium.com/@ foursquarejeb/ effective-teaching-27e8397ec176

Kamau, G. W., Kiplang'at, J., & Odini, C. (2016). *Access to and use of ICT in the provision of information to distance learners in Kenyan Universities.* Emerging Trends in Libraries and Information Centres, 51- 73.

INTERCONTINENTAL ACADEMIC JOURNAL OF LIBRARY AND INFORMATION SCIENCE, VOL 5 NO 1, APRIL 2023, GERMANY. ISSN (P): 2659-1072, ISSN (E): 2659-1074

Essien Edem UDO, *Ph.D* & JACKSON, Glory Jackson

Kattimani, S. F. & Naik, R. R. (2012). *E-Learning Technology in the ICT Era:* Application to Technical Education. DESIDOC Journal of Library & Information Technology. 32 (6), 459-467.

Killion, J. & Hirsh, S. (2011). The *elements of effective teaching*. Available at: https: //learning forward. org/journal/effective-teaching/the-elements-of-effective-teaching/

Mason, M. G. (2010). *Strategic management for today's libraries,* New Delhi, India: Ess Publications.

Menyeh, A. (2009). *Meeting the challenges to sustainable development in Africa through science and technology education in Holbrook and pennayelu*(eds). Meeting challenges to sustainable development in Africa. Ibadan ICASE.

Ndung'u, J., & Otike, J. (2018). *Community information services in public libraries*: A case of KNLS Nairobi County.

New World Encyclopedia (2022). *Introduction of Library.* Available at; https://www.new worldencyclopedia.org/entry/Library

New World Encyclopedia (2022). *Library Science.* Available at: https://www.new worldency-clopedia.org/entry/Library_Science

Nworie, J. C., Obiyan, O. M., Nworie, H. O., & Irunebo, G. H. (2018). Exploring the role of libraries in using digital platforms to achieve quality education for sustainable development in Nigeria. *Journal of Information Knowledge Management*, 9 (1), 89-99.

Okiy, R. B. (2010). *Globalization and ICT in academic libraries in Nigeria*: the way forward. Library Philosophy and Practice, 1-10.

Uziogwe, C. (2018). *Meaning of library origin types and their function.* National Open University of Nigeria Library Orientation Manual. Jabi, Abuja: NOUN Press

Wikipedia (2021). *Library.* Available at: https://en.wikipedia.org/wiki/Library