

Review

Training of teacher-librarians in multi-media methods and materials production in Delta state, Nigeria

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This paper tends to unveil the need to train teacher-librarians with multi-media methods since most of the schools lack teacher-librarians to take the mantle of rendering effective service to students and at the same time embarking in teaching other subjects in their own area of specialization. A descriptive research method was employed in this research on the need to acquaint teacher-librarians with multi-media application in their daily routines. The findings revealed that students are the result of the establishment of schools and the service of teaching. The teaching learning process to students is in the hand of teachers with quality resource, skills, knowledge ability and application of multi-media in their activities. A befitting library with current material resources and multi-media/information and communication technology (ICT) infrastructure brings about good atmospheric learning condition if skillfully discharged by the teacher-librarians. It was indicated that the roles of teacher-librarians in this modern era would be questionable in the absence of good multi-media knowledge as an embodiment of ICT. This research and its findings will assist policy makers in Nigeria to plan and incorporate adequate funding of school libraries in order to acquire modern multi-media technologies/ICT infrastructure to enhance their operations. It will also help private organization/institutions to decide on the need to include multi-media/ICT infrastructure into their strategic plans.

Key words: Teacher-librarian, multi-media, information and communication technology (ICT), Nigeria.

INTRODUCTION

Teacher-librarians are becoming one of the most challenging professions in library and information science schools in the society where knowledge is expanding rapidly and much of it is available to students as well as, teacher-librarians at the same time (Perraton et al., 2001). As new concepts of learning have evolved, teacher-librarians are expected to facilitate learning and make it meaningful to individual learners rather than just to provide knowledge and skills. Modern developments of innovative technologies has provided new possibilities to teacher-librarians professions, but at the same time have placed more demands on teacher-librarians to learn how

to use these new technologies in their teaching (Robinson and Latchem, 2003). These challenges push teacher-librarians to continuously retrain themselves and acquire new knowledge and skills while maintaining their job (Carlson and Gadio, 2002). Then what can be done to help teacher-librarians meet these challenges? Indeed, other than to train them.

The training of teacher-librarians is undergone in Library and Information Science schools and Library and Information Science as a discipline embraces various components of Library resource and operations. The discipline, Library and Information Science centres on the systematic study of the principles and skills pertinent to all aspects of library operations, resources and administration. The library resources and operations are not static (Edoka, 2000). He went on to say that changes

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in technology, user needs and societal changes affecting the flow of information can affect existing patterns of service. Library and Information Science discipline embraces the basic aspect of the related discipline of information science and archival studies.

The discipline is increasingly interdisciplinary in approach and related with appropriate subject to broaden and enrich itself. It is expected that at the point of one's training in library and Information Science Schools, one is made to take some extra-curriculum subjects that will broaden and enable him/her function in the workplace; hence there are so many individuals who are both librarian and teachers. They work alongside the library routine while teaching some subjects. The students, their parents and the teacher-librarians have their different roles to play in order to have a befitting and outstanding school for the students.

USES OF A SCHOOL LIBRARY TO STUDENTS

1. It supplies the children/students with a constant up to date books and library materials to meet all educational needs.
2. It promotes reference materials suitable for the curriculum of the school.
3. A forum for the students for discussion and sharing of their experiences.
4. It helps in the growth and development of the child.
5. Children develop self education.
6. It opens up ways for the children fact finding process.

ROLES OF THE TEACHER-LIBRARIANS FOR AN EFFECTIVE SERVICE

1. Motivates the students to study their book along their curriculum.
2. Guides and assists them in selection and acquisition of book.
3. Makes him/herself aware of the materials available in the school library and beyond.
4. Should participate amongst others in the designing of their school curriculum.
5. Should give the students assignment that can be carried out in the library.

ROLES OF THE PARENTS

1. They can donate both books and non-book materials
2. They can also help in the provision of fund to equipped or building up the library.
3. They should visit and watch their children use the library once in a while.
4. They cultivate the attitude of attending Parents' Teachers Association (PTA) so as to discuss matters

relating to the welfare and growth of their children

QUALITIES OF A TEACHER-LIBRARIAN

The qualities of a teacher-librarian are as highlighted thus:

1. A teacher-librarian should be academically, morally and professionally sound,
2. Should have a wide interest on books,
3. Should be a lover of children, sympathetic, enthusiastic and energetic to carry out her function,
4. Is dealing with the public and so should be public patient and down to earth,
5. Should be a good organizer, initiator and a good planner.

Edoka (2000) said that the responsibility of the teacher-librarians dwell on activities happening in the school libraries and the school library is an educational institution that supports the educational work of their parent institutions. However, they are sufficiently different from libraries in higher institution of learning. Therefore, they merit distinct treatment. The achievement of these outstanding roles of teacher-librarians in modern times would be questionable in the absence of good knowledge of multi-media as an embodiment of information and communication technology (ICT) (Edoka, 2000).

Today, a variety of ICT can facilitate not only delivery of instruction, but learning process itself. Moreover, ICT can promote international collaboration and networking in education and professional development. There is a range of ICT option - from videoconferencing through multi-media delivery to web sites – which can be used to meet the challenges teacher-librarians face today (Heathcote, 2006). In fact, there has been increasing evidence that ICT may be able to provide more flexible and effective ways for lifelong professional development for today's teacher-librarians (Heathcote, 2000).

Based on rapid development of ICT, especially the internet, traditional initial teacher-librarians training as well as in-service continued training institution worldwide are undergoing a rapid change in the structure and content of their training and delivery methods of their courses. However, combining new technologies with effective pedagogy has become a daunting task for both initial teacher-librarians training and in-service institutions (Bowes, 2003).

WHAT ARE ICTs?

Information and communication technologies (ICTs) are a term which is currently used to denote a wide range of services, applications, and technologies, using various types of equipment and software, often running over telecom networks (Heathcote, 2000). ICTs include well

known telecom service such as telephone and fax. Telecom service used together with computer hardware and software from the basis of a range of other service, including email, the transfer of files from one computer to another, and in particular, the internet, which potentially allows all computers to be connected, thereby giving access to source of knowledge and information stored on computers worldwide (Heathcote, 2000).

Its application includes videoconferencing, telereporting, distance learning, management information system, stocktaking; technologies can be said to include a broad array ranging from 'old' technologies such as radio and TV to 'new' ones such as cellular mobile.

Concepts of multi-media

Media refers to the delivery of information in intuitive, multi-sensory ways, through the integration of distinct media such as texts, graphics, computer animation, motion video, and sound, in a single presentation under the control of the computer. It is an exciting mix of graphics, texts, animation and photographs on the computer system (Heathcote, 2000).

Multi-media presentations are very impressive. They combine movies, sound and animated graphics to achieve an impact that is beyond the sum of the individual part. A multi-media system has transformed the PC from a computational tool to the centre of the whole entertainment system. In a common sense, a multi-media is mostly considered a PC with sound card and CD-Rom drive (Heathcote, 2000):

Multi-media = PC + Sound Card + Speakers + CD- Drive.

He went on to say that the expansion slots on the motherboard (the main board of the computer that houses the processor, RAM VGA card etc) have made the expansion of the PC to accommodate devices or features beside that primarily responsible for providing computational power. These components include:

1. Sound card,
2. MPEG movie card,
3. TV and cable tuner card etc.

With all these components on the system, the PC is turned into a music box, a film editing system, a radio box and a television system respectively. However, only a few of the communication ports at the back of the system unit are used for normal business work, in most cases, the mouse, keyboard and printers ports. The remaining ports can therefore be fully used for connecting a scanner, a modem, microphone, light pen and external CD-ROM drive (Heathcote, 2000). Without the compression technology to squeeze several megabytes of gobbling images into a small space, digital video would be

impracticable. Multi-media make unprecedented demand on storage space with the high-resolution graphics and sound files.

CD-ROM is best for distributing multi-media applications. WORM drives, re-writes able CD-ROMs, and magnetic optical drives offer the possibilities of denser and cheaper storage. Though most CD-ROMS are strictly read only, they hold more than 600MB storage each in a rugged and compact package. Above all, their drives can be added to modern PCs at a reasonable cost (Heathcote, 2000).

The forerunner of digital video is the digital video interactive (DVI). It is a compression and playback technology originally developed by RCA and eventually acquired by Intel Corporation. DVI is a set of processor chips developed by Intel to compress video onto disk and to decompress it for playback in real-time. Once the compression is done, the result can be stored on CD-Rom and played differently from CD-ROM disk by any PC equipped with a DVI playback board (Heathcote, 2000).

Stern and Stern (2005) posit that multi-media - the combination of text, animated graphics, and sound - present information in a way that is more interesting and easier to grasp than text alone. It has been used for education at all levels, job training, and games and the entertainment industries. It is becoming more readily available as the price of personal computers and their accessories declines. Multi-media as a human - computer interface was made possible some half - dozen years ago by the rise of affordable digital technology. Previously, multi-media effects were produced by computer-controlled analog devices, like videocassette recorders, projectors and tape recorders. Digital technology's exponential declines in price and increase in capacity has enabled it to overtake analog technology. The internet is the breeding ground for multi-media ideas and the delivery vehicle of multi-media objects to a huge audience (Stern and Stern, 2005).

Heathcote (2000) is of the view that multi-media generally indicates a rich sensory interface between humans and computers or computers-like devices - an interface that in most cases gives the user control over the pace and sequence of the information. People know multi-media when they see and hear it, yet its precise boundaries elude them. For example, movies on demand, in which a viewer can select from a large library of videos and then play, stop, or reposition the tape or change the speed is generally considered multi-media. However, watching the movies on a TV set attached to a videocassette recorder (VCR) with the same abilities to manipulate the play is not considered multi-media. Unfortunately, we are yet to find a definition that satisfies all experts.

Recent multi-media conference, such as the international conference on multi-media computing and systems (ICMCS), multi-media computing and networking (MCN) provide a good start for identifying the

components of multi-media. The range of multi-media activity is demonstrated in papers on multi-media authoring (that is specification of multi-media sequences), user interfaces, navigation (user choices,) effectiveness of multi-media in education, distance libraries, indexing and retrieval, and support of collaborative work (Stern, 2005). The wide range of technologies is evident in papers on dish scheduling, capacity planning, resources management, networking, quality of service in networks, moving picture expert group (MPEG) encoding, compression, caching, buffering, storage hierarchies, video servers, video file systems, machine classification of video scenes, and internet audio and video (Stern, 2005).

Multi-media systems need delivery systems to get the multi-media objects to the user. Magnetic and optical disk were the first media for distribution. The internet, as well as the transmission control protocol/internal protocol (TCP/IP) protocol suite or NETBIOS on isolated or campus World Wide Web browser are being augmented with animation, video, and sound. Internet distribution will be augmented by distribution via satellite, wireless, and cable systems (Heathcote, 2000). Multi-media applications are primarily existing applications that can be made less expansive or more effective through the use of multi-media technology. It has the potentials for the educational training of the modern child/students (Heathcote, 2006).

A wide range of individual educational software employing multi-media is available on CD-ROM. One of the chief advantages of such multi-media applications is that the sequence of material presented is dependent upon the student's responses and requests. Multi-media are also used in the classroom to enhance the educational experience and augment the teacher's work. Multi-media for education have begun to employ servers and networks to provide for larger quantities of information and the ability to change it frequently (Heathcote, 2006). This is a variation on education in which not all of the students are in the same place during lectures. Education takes places through a combination of stored multi-media presentations, live teaching, and participation by the students. Distance learning involves aspects of both teaching with multi-media and video conferencing. The role and knowledge of the teacher-librarian is of paramount importance in this circumstance and practice (Stern, 2005).

Multi-media is obviously a fertile ground for both teacher-librarian researcher and the development of new products, because of the breadth of possible usage, the dependency on a wide range of technologies, and the value of reducing cost by improving the technology. Now that the technology has been developed, however, the marketplace will determine future direction. The technology will be used when clear value is found. For example, multi-media are widely used on PCs using CDs to store the content. The CDs are inexpensive to

reproduce, and the players are standard equipment on most PCs purchased today. The acceptance caused a greater demand for players, which, in turn caused greater production and further reduced prices (Heathcote, 2000).

The computer/multi-media industry is providing demand, and an expanding market, for the key hardware technologies that underlie multi-media. These include solid-state memory, logic, microprocessor, modems, switches, and disk storage. As a result, the application of multi-media, which appears expensive now, will become less expensive and more attractive (Heathcote, 2000). An exception to this fast rate of improvement is the cost of data communication. Communications depend on technology with rapidly decreasing cost and on mundane and basically unchanging task such as laying cable with help of a backhoe or stringing cables from poles. The cost of communication is not likely to decline significantly for quite a while.

We feel that multi-media will spread from low-bit-rate to high-bit-rate, and will begin on established intranet first, move to the internet, and finally be transmitted on broadband connections (ADSL or cable modems) to the home (Heathcote, 2000). The initial uses will be information dissemination, education, and training on campus LANs of teacher-librarians. Multi-media will be used in government, business, and education and in Library and Information Science Schools, with low-bit-rate video that will not place excessive stress on the infrastructure. The availability of switched WAN technology and faster LANs will allow increases in both the bit rate per user and the number of users. As the cost of communications decreases, the cost for internet attachment for servers will decline, and higher-quality video will be used on the internet. Multi-media will be a compelling interface for commerce and advertising on the internet. Eventually, cable modems and/or ADSL will provide bandwidth for movies to the home, and the declining computer and switching costs will allow a cost-effective service (Heathcote, 2000).

The winner between ADSL and cable modems will have as much to do with the ability of cable companies and RBOCs to raise capital as inherent with cost and value of the two technologies (Heathcote, 2000). Multi-media used for the training of teacher-librarians in library and information science schools is the combination of several elements such as text, graphic, animation, video and sound using a computer. All these are found in librarian schools. These helps to create or run multi-media software, a family powerful computer with a large memory, hard disk and a CD ROM drive is desirable in communication industry; while networks may comprises of copper or fiber optic cable, wireless or cellular mobile links, and satellite links. Equipment includes telephones handsets, computers and networks elements such as base stations for wireless service; while software programmes are lifeblood of all these components, the sets of instructions behind everything from operating

systems to the internet (Heathcote, 2000). Thus, services as basic as telephones are the issue, as application as complex 'telemetry', for example, to remotely monitor water conditions as part of a flood forecasting system. Indeed, many service and applications can be made available as soon as telephone service is provided, the same type of technologies that are used to transmit voice can also transmit fax, data, and digitally compressed video (Carson and Gadio, 2002). The importance of ICTs is not the technology as such, but its enabling functions is access to knowledge, information and communications, increasingly important elements in today's economic and social interaction (European Commission, 2001).

ICTs AND TEACHER-LIBRARIANS EDUCATION

It has been argued that technology for teacher-librarians' professional development is not a panacea – it is only a tool (Haddad, 2002). To use this tool effectively and efficiently, teacher-librarians need visions of the technologies' potential, opportunities to apply them, training and just-in-time support, and time to experiment. Only then can teacher-librarians be informed and confident in their use of new technologies (Bowes, 2003). ICTs are a major tool in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools fundamentally changed the way people communicate and do business. They have produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. They also have the potential to transform the nature of education-where and how learning takes place and the roles of students and teacher-librarians in the learning process (Bowes, 2003).

Teacher-librarians education institution may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technologies change. For education to reap to its full benefits of ICTs in learning, it is essential that pre-service and in-service for teacher-librarians have basic ICT skills and competencies. Teacher-librarians institutions and programs must provide the leadership for pre-service and in-service teacher-librarians and model the new pedagogies and tools for learning. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country (Bowes, 2003). To accomplish these goals, teacher-librarians institution must work closely and effectively with primary and secondary school teachers and administrators, politicians and other important agencies, teacher-librarians unions, business and community organizations, and other important stakeholders in the educational system. Teacher-librarians education institutions also need to develop strategies and plans to enhance the teaching – learning process within teacher-librarians education

programs and to ensure that all future teacher-librarians are well prepared to use the new tools for the learning (Bowes, 2003). This is more crucial because the young generation is entering a world that is changing in all spheres' scientific and technological, political, economic, social and cultural. The emergence of the 'knowledge-based' society is changing the global economy and the status of education (Bowes, 2005). These new possibilities exist largely as the result of two converging forces. First the quantity of information available in the world- much of it relevant to survival, and basic well-being-is exponentially greater than that available only a few years ago, and the rate of its growth is accelerating. A synergistic effect occurs when important information is coupled with a second modern advance – the new capacity to communicate among people of the world. The opportunity exists to harness this force and use it positively, consciously, and with design, in order to contribute to meeting defined learning need (European Commission, 2001).

European Commission (2001) viewed that, "As in the case for other sectors of the wider economy and society, education will need to cope with the new technologies. This could require substantial public and private sector investment in software research and development, purchase of hardware, and refurbishment of Library and Information Science schools". It will be difficult for national policy-makers to resist finding the necessary resources, whatever their sensibilities for expenditure on education, although, without international co-operation and assistance, the poorest countries could fall further still and accept not too long the notion that education should be less equipped with the new technologies than other areas of social and economic activity (UNESCO World Education Report, 1998).

UNESCO (1998) posit that, thus education is at the confluence or powerful and rapidly shifting educational, technological and political forces that will shape the structure of educational systems across the globe. Many countries are engaged in a number of efforts to effects changes in the teaching/learning process to prepare Library and Information Science students for an information and technology-based society. The UNESCO World Education Report (1998) noted that the new technologies challenges traditional conceptions of both teaching and learning and, by reconfiguring how teacher-librarians and learner gain access to knowledge, have the potential to transform teaching and learning processes. ICTs provide an array of powerful tools that may help in transforming the present isolate, teacher-librarians – centred and text-bound classroom into rich, student-focused, interactive knowledge environment. To meet up with the global trends, the Library and Information Science schools must embrace the new technologies and applying the new ICT tools for learning. They must also move towards the goal of transforming the traditional paradigm or learning (UNESCO, 1998).

UNESCO (2002) are of the view that to accomplish this

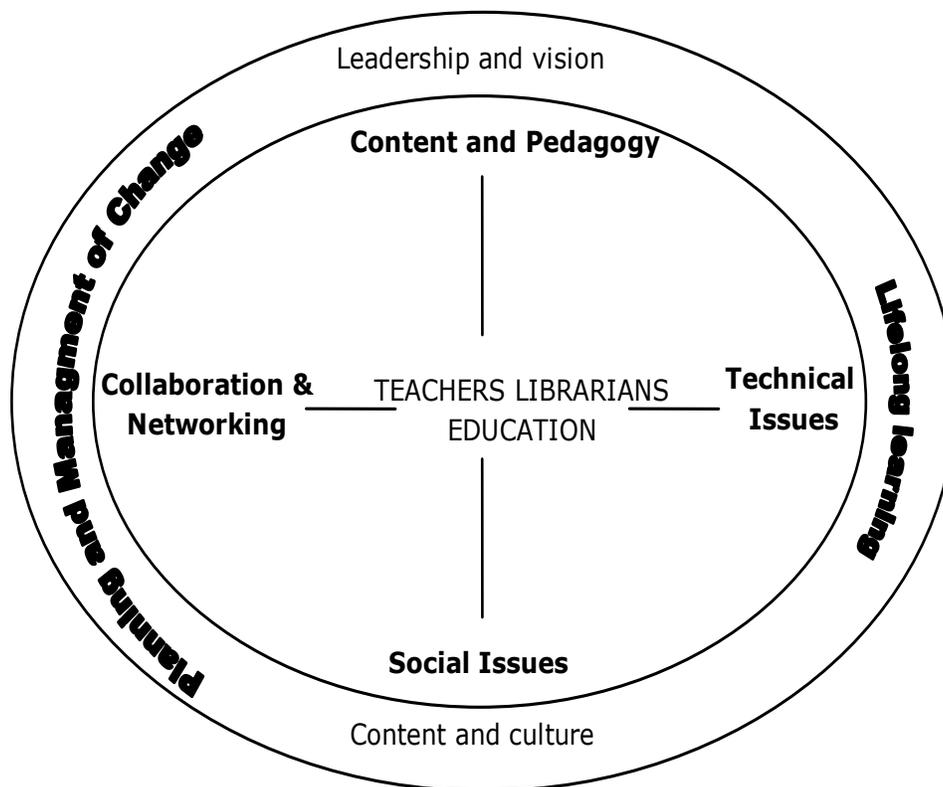


Figure 1. A Framework for ICTs in teacher-librarians education (UNESCO, 2002).

goal requires both a change in the traditional view of the learning process and an understanding of how the new digital technologies can create new learning environments in which students are engaged learner, able to take greater responsibility for their own learning and constructing their own knowledge. Kuhn (2000) suggested that revolutions in science come about when the old theories and methods will not solve new problems. He calls these changes in theory and methods a “paradigm shift” There is widespread concern that the educational experience provided in many Library and Information Science schools will not prepare Library and Information Science students well for the future. Many educators and business and government leaders believe that creating a paradigm shift in view of the learning process, coupled with application of the new information technologies, and may play an important role in bringing educational systems into alignment with the knowledge-based, information-rich society (Laudon, 2004).

FRAMEWORK FOR ICTS IN TEACHER-LIBRARIANS EDUCATION

In planning for the infusion of ICTs into teacher-librarians preparation program, several factors are important and a program’s success must be considered. UNESCO

provides a generic ICT in a teacher-librarians education curriculum framework, as shown in Figure 1. As presented in Figure 1, context and culture identifies the culture and other contextual factors that must be considered in infusing technology into teacher-librarians education curriculum. It includes the use of technology in culturally appropriate ways and the development of respect for multiple cultures and contexts, which need to be taught and modeled by teacher-librarians. Leadership and vision are essential for the successful planning and implementation of technology into teacher-librarians education and require both leadership and support from the administration of the teacher-librarians education institution. Lifelong learning acknowledges that learning does not stop after school.

In common with the other themes, it is important that teacher-librarians preparation most meet faculty model lifelong learning as a key part of implementation, and an ongoing commitment to ICTs in teacher-librarians education. Planning and management of change is the final theme, born of today’s context and accelerated by technology itself. It signifies the importance of careful planning and effective management of the change process. These themes may be understood as a strategic combination of approaches that help teacher-librarians educators develop core competencies necessary for effective use of ICTs in teacher-librarians critical for

successful use of ICTs as tools for learning.

Competencies for ICT in teacher-librarians education

Pedagogy

The most important aspect of infusing technology in the curriculum is pedagogy. When implementing the pedagogical competencies for infusing technology, the local context and the individual approach of the teacher-librarians linked with that of their subject discipline must be paramount. Professional teacher-librarians educators should continually develop their pedagogical use of ICTs to support learning, teaching and curriculum development, including assessment of learners and the evaluation of teaching. This would be of immense benefit in the collection development and management process of school libraries by the teacher-librarians in collaboration with members of the selection team such as classroom teachers, headmaster/principals, and representation of staff of this primary/secondary education board (Bowes, 2003).

The teacher-librarians effectiveness in this context require an appreciable knowledge of multi-media technologies and this applications help in selection, acquisition and processing of information resource for the growth of school libraries in our modern society that anchors on electronic technologies. Some of the realistic aspect of this process is access to electronic selection aids such as:

1. AcQWEB (<http://acqwebilibrary.vanderbilt.edu>): This site provides useful links to a number of selection/verification tools and resources including imprints and price listings, out-of-prints, rare and antiquarian agents, library catalogues and bibliographic utilities, and web collection and resource.
2. Amazon.combook online (www.amazon.com): This site list book titles, review, price etc.
3. Reviews, such as booklist (www.ala.org/booklist); bookwire (www.bookwire.com).
4. Library catalogues, such as COPAC (UK) (WWW.capac.ac.uk/copac); and library of congress (www.loc.gov).

From these concepts about learning, and more recently from discussion of the skills set needed in the “global, knowledge economy.” DeVol (1998) said new pedagogical rubrics have emerged that include cooperative learning, active learning, project-based learning, problem-based learning, situated learning and, most recently, “learning by doing” (Roschelle, 1995). These approaches all aim at a transfer of emphasis away from rote-base methods and assessment, and the teacher-librarians as the “producer” of knowledge.

Instead, they emphasize the roles of analysis,

synthesis, and other higher-order cognitive skills play in learning, with particular focus on learning and building their own knowledge (Roschelle, 1995).

Expanding our view of multi-media must also take into account multi-media examination formats. Students and faculty feel that incorporation of rich media in assessment can provide additional support for learning and teaching (Liu, 2001). Advances in technology, cognitive science, and measurement also show the need to reinvent large-scale assessment (Bennett et al., 2001) and this process of reinvention may stand to benefit from incorporation of multi-media (Bennett et al., 2001). Dynamic stimuli, such as audio, video, and animation, may make performing such task as problem solving more relevant to student experience (Bennett et al., 2001). To accomplish this objective, multi-media development must considered cognitive complexity, sensitivity to instruction, meaningfulness, reliability, fairness, and linguistic appropriateness (Baker and Mayer, 1999). Multi-media material produced for teaching and learning must be produced for assessment as well, with compatible goals, similar depth, and equal (Baker and Mayer, 1999).

The instruction context

When developing educational multi-media resources, it is important to take into account objectives at the level of the individual learner, the Library and Information Science school, and the state. Each has different characteristics, expectations, and needs, and means to fulfill them are all interrelated. For this reason, development of learning resources is linked strategically with processes of educational reform and the transformation of teaching and learning. Consequently, four points of focus are suggested for planning the development of multi-media educational material (Bransford and Kelvin, 2000).

Learning-centred

What kind of approaches and materials would be flexible enough to consider student’s previous knowledge, cultural practices, and beliefs while connecting them to academic tasks? How can the process of teaching and learning from each student’s be special interest and strengths?

According to Wiske (1998), project –based learning activities are just one way to achieve these goals. Technology also may enable us to support these goals through a combination of pre-authoring (this is design) tools, classroom work, portfolio-organization systems, publication systems, and collaboration tools. In such an environment, the most useful multi-media material might be small bits and pieces of software that are pluggable and insertable in students; page and projects (applets 18,

Fish Shockwaves files, video clips) perhaps allowing user customization. Examples of this combination of a tool-based learning environment and pre-existing content can be found in ‘micro worlds,’ often written in Java, such as Proyecto Descartes (<http://www.decartes.es>). In this environment, teacher-librarians and students are motivated not only by the drive for visual quality in their work, but the opportunity to use and discuss material that they, working independently in the classroom-based learning environment, would be unable to produce on their own.

Knowledge-centred

How can we design curricular to promote understanding instead of the acquisition of disconnected sets of facts and skills? How can we develop in teacher-librarians and students the ability to think and solve problems by accessing appropriate knowledge?

Multi-media may help in making accessible theme that would be very hard to understand or to connect to reality – as demonstrated by the site, Physic 2000 (<http://www.colorado.edu/physics/2000>). It also can help in enabling learning to reframe knowledge. They may use conceptual maps linked to Web that highlight different aspect of a content domain: how knowledge is acquired by experts; how problems are solved; what language is used in the domain; the current pathways of deepening knowledge; and the different possibilities to presenting for different publics of different ages (Nunes et al., 2001).

Multi-media also can broaden the scope of school learning environments by enabling experiments that otherwise would be too dangerous, expensive, and difficult or take too long. There are already some excellent CD-ROMs available in these niches and visualization and modeling tools give students the opportunity to enter into much more complex knowledge –context (so many of which are now necessary in our world than ever before), while continuing to build their comprehension of the core knowledge of those domains (Galde et al., 2002).

Assessment-centred

How can we provide opportunities for teacher-librarians and students to revise and improve the quality of their thinking and understanding? Technology can help facilitate self – assessment and other meta-cognitive activities in students, in part by giving frequently feedback. Collaborative tools and communication tools may promote reflection and learning as a social activity, enhancing the potential for conceptual change.

Interactive multi-media can play a crucial role in helping students overcome misconceptions in other ways as well. Students can be enabled to develop their hypothesis as far as possible, aided by the capabilities of well-planned multi-media (Nunes and Davis, 2001). At

that extreme point of development, visual feedback can intervene, providing alternatives or deconstructing their beliefs. It is possible to produce simulations and animations that feature embedded “expert-systems examples”, demonstrating how experts have addressed the same problems or arrived at true conclusion, only after students tried the simulations on their own (Nunes and Davis, 2001).

Community-centred

To what extent are teacher-librarians and students aware of the differences in learning in school and in their social environment? Do they identify the building blocks of knowledge, and what knowledge they already have as applicable to real- world problems? How students can becomes aware of their role in a globalizing world and understands the importance of formal education in that world?

Technology can play a crucial role in connecting Library and Information science schools to professionals in their communities and around the world, and by allowing the school to develop ideas and positions and make them public. What types of multi-media material support more community-centered environments? People need to see and reflect on real and very often dramatic situations. Discussion can be sparked by showing video. It may be useful to begin with small problem sets, in which only the most relevant variables are shown; then other variables can be inserted step by step. All of these features can be implemented in well- planned simulation (Nune and Davis, 2001). Clearly, there are no boundaries among these four focal areas. When we construct an assessment –centered learning environment, we create elements of a learner-centered environment. When we build a community–centered environment, we satisfy our criteria for a knowledge-centered environment. We – designed systems, combine characteristic of all four (Riel, 2000). One way to ensure the interweaving of characteristics of all such environments is to ask what resources would be required for “hands-on, minds-on, and reality-on” learning activities (Riel, 2000).

CONSTRAINTS OF ICTS IN TEACHER-LIBRARIANS EDUCATION

The importance of training teacher-librarians for successful integration of ICTs into education is finally recognized but not well financed and implemented. There are many prevailing issues that constrain the effectiveness of such teacher-librarians training (Riel, 2000) some of which are:

1. Many programs are limited to computer literacy and do not train teacher-librarians in the instructional use of technology.
2. Most programs are supply driven – if we supply

training we ensure classroom success. The demand side is equally important. We have to consider the demands of teacher-librarians needs, interests, attitude, etc. Why do teacher-librarians not make better use of instructional ICTs? Do they see a practical of ICTs in their classrooms, or do they consider technology as a threat and a waste of time? Does the school environment (nature of the curriculum, role of teacher-librarian and student, allowance for innovation) demand or at least allow for the use of ICTs to add value to the teaching/learning process?

3. Some training sounds like a selling pith, applying the great benefits of ICTs for the teacher-librarians and the students, the school and the world at large! This is recipe for fanaticism and frustration. Training should be grounded in realism and educational context, ICTs potential, limitations, and conditions for success.

4. No training, no matter how good, can be a one shot intervention. Training in the use of ICTs for instructional and learning purposes take an individual handholding. The reasons are many; even the most knowledgeable and enthusiastic energetic teacher-librarians face time constraints and competing demands to learn new things; technologies are unreliable – the more sophisticated and promising they are, the more they break down. Both hardware, software and educational application keep changing; and, teacher-librarians need time to figure out a comfortable and beneficial zone of use of ICTs in their classrooms. It is usually assumed that training for educational technologies is an in-service or a specialized activity. What about integrating it into pre-service or initial teacher-librarians education? Can new teacher-librarians be prepared to teach in a digital age? A 1999 study – commissioned by Miklen Exchange and conducted by the International Society for Technology in Education (ISTE) – found that teacher-librarians preparation program, while well-intentional, are providing the kind of training and exposure teacher-librarians need if they are to be proficient and comfortable integrating technology with their teaching.”

5. In the UK, ICT is now an integral part of the teacher-librarians training National Curriculum. “The curriculum aims, in particular, to equip every newly qualified teacher-librarians with the knowledge, skill and understanding to make sound decisions about when, when not, and how to use ICT effectively in their subject teaching”. The Teacher-librarians Agency, a governmental body whose purpose is to raise standards in Library and Information Science schools by attracting, has also produced exemplification materials on the use of ICTs in subjects teaching.

CONCLUSION

Teaching and learning methods and style in the 21st century is dramatically changing. This has ironically been

the prerogative of the modern philosophy of librarianship on the paradigm shift from “holdings” to “access”. The possibility of this Philosophy anchors largely on ICTs in which multi-media technology such as the CD-Rom and DVD belong. This technology can only have overwhelming effects if everyone is carried along, particularly the world’s future substances (our children, and the younger generation). This circumstance has gained considerable ground in the developed part of the world in which Africa as a developing continent cannot afford to be left out. Nigeria as a developing nation in this, should brace-up this challenge by training teacher-librarians on multi-media methods and material production. This would enable them function adequately especially in the acceptance of implementation of the 2004 National Policy on Education that emphasized the issue of ICTs in her Secondary and Pre-secondary schools where teacher-librarians function.

The knowledgeability of teacher-librarians in this direction would in no little measure facilitate the achievement of such dreams and effort; otherwise its success is at a sensitive pedestal in this situation.

RECOMMENDATIONS

Committed people to teaching and improving the quality of teacher-librarians should be able to stand in test of time. According to Carlson (2002), teacher-librarians professional development in the use of technology should embody and model the forms of pedagogy that teacher-librarians can use themselves in their classrooms. For example, these training programmes should:

1. Empower teacher-librarians to develop their knowledge and skills actively and experientially, in variety of learning environments, both individual and collaborative.
2. Include a variety of learning strategies, direct instruction, deduction, discussion, drill and practice and induction and sharing.
3. Aim at higher-order thinking skills.
4. Provide an authentic learning environment so that teacher-librarians can engaged in concrete tasks within realistic scenarios.
5. Emphasize ways that multi-media technology can facilitate and enhance teacher-librarians professional lives.
6. Encourage teacher-librarians to be mentors, tutors and guides of the students’ learning process (rather than simple presenters of knowledge and information).
7. Develop teacher-librarians skills in learning how to learn (define learning objectives, plan and evaluate learning strategies, monitor progress and adjust as needed).
8. Promote cooperative and collaborative learning.
9. Be sensitive to the culture and diversity of teacher-librarians as learning, using a multifaceted approach so

as to respond to different learning styles, opportunities, environments and starting points.

10. Enable learning independent of time and place.

One of the most revealing studies of technology integration is a ten year study of Apple Computers' Classroom of Tomorrow (ACOT). These are elementary, middle, and high school classes in average or low income districts that have been infused with technology; each students and teacher-librarians have a computer in schools and another at home. Teacher-librarians receive intensive support in teacher's librarian beliefs, attitudes, and behavior and have identified stages of development that teacher-librarians go through on their ways to integrate technology fully into their instructional programme. These stages and concomitant characteristics are summarized in the chart as adopted from Dwyer et al. (1991).

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APPENDIX

Examples of best practice that work

Apple classrooms of tomorrow (ACOT)

Promising practice in technology

Recognizing and support teaching with technology

The Apple Classrooms of Tomorrow (ACOT) research project was both explanatory and open-ended. The project was initiated in 1985 by Apple Computers, Inc. in the United States to answer the question: *What happens to students and teachers librarians when they have access to computer whenever they need it?* Over the following four years, sites were selected, computer were provided for ACOT classrooms, and training was provided for teacher-librarians in 1990, the first reports were published, and ACOT project staff began making presentations at the conferences and educational meetings. By 1995, the message was clear ; the conversation should be about learning, not computers. During the decade of study from 1985 to 1995, the ACOT teacher-librarians used technology as a motivator for change. They enriched their lessons with technology and turned the assignments into collaborative learning activities. The ACOT study determined that teacher-librarians progress through certain stages as they incorporated technology into teaching learning in their classrooms. These stages can be described as shown in the chart highlighted:

Stage	Example of what teacher-librarians do
Entry	Learn the basics of using technology
Adoption	Use new technology to support traditional instruction
Adaption	Integrate new technology into traditional classrooms practices (Here, they often focus on increase student productivity and engagement by using word processors, spreadsheet and graphic tools)
Appropriation	Focus on co-operative, project-based, and interdisciplinary work-incorporating the technology as needed and as one of many tools
Invention	Discover new users for technology tools, for example, developing spreadsheet macros for teaching algebra or designing project that combine multiple technologies

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Teacher-librarians experience varied in stages with different types of technology and teaching strategies. As teacher-librarians advanced through the stages, they become guides, while the students took more ownership of their own learning, frequently doing so in co-operative groups. The chart below shows the shift of that occurred in the classrooms, from traditional instruction to extended knowledge construction.

Activity	Traditional instruction	Extended knowledge construction
Teacher-librarian role	Teacher-librarian centred and didactic	Learner-centred and interactive
Student role	Fact teller and expert	Collaborator/sometime learner
Learning embrace concepts of knowledge	Listener and Learner	Collaborator/Sometime expert
Demonstration of success	Facts and replication quantity	Relationship and inquiry Quality
Assessment	Norm-referenced and multiple guess	Transformation criterion-referenced and performance portfolios
Technology use	Seat work	Communication, collaboration, information access and expression

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