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THE PLACE OF COMPUTER SOFTWARE IN TEACHING AND LEARNING OF MATHEMATICS

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Abstract

This paper looked at the place of software in teaching and learning of Mathematics. The paper also considered various types of software used in teaching and learning of mathematics, the impact of software in schools with regard to students; teachers and teaching strategies. The system classification involves in the use of different types of software to enhance teaching and learning was also looked into.

Introduction

Information and communications technology (ICT) has transformed the means by which we inform ourselves, remain up to date with world events and areas of personal interest and further our learning. For many books and journals are no longer the first or primary sources of information or learning. We now regularly rely on images, video, animations and sound to acquire information and learn. Increased and improved access to the internet has accelerated this phenomenon. We now acquire and access information in ways fundamentally dependable on computer software. The founder of technology support centre in Nigeria said, it has been proved that technology enabled learning increases students' performance by 30 percent, (Armstrong, 2008).

ICT availability and use are relatively low for all categories of staff and students, (Nwaboku, 2005). In most schools and in majority of our higher institutions, the resource to teach mathematics are not readily available and where they are available some of the available equipment are outdated and does not support the use of modern software for learning and teaching. Very few principal teachers in our secondary schools recognize fully their role in implementing effective use of ICT for learning and teaching, that is the more reason why most of the equipment donated to schools are kept or locked up in a room without putting them into use.

Inability of the teacher to fully understand the information/concepts he/she is presenting to the class is also contributing immensely to what is lacking in the use of ICT to enhance effective teaching and learning. There was a case of a Professor of Mathematics who despite teaching a particular topic to his students twice, the students still did not understand the topic. But at the third attempt the students understood and the Professor confessed that that was the first time he also understood the topic (Olaleru, 2008). Hence, there is the need to enhance the teaching and learning of mathematics by the use of computer software.

The technology enabled-learning assist both the students and the teachers to have a global academic experience. The learners and the teachers must have access to technology to be able to use technology. Teachers have always used tools to help them present the material to be learned. Some of these tools we classify today as "low tech"---such things as chalk and chalkboards, magic markers and poster paper; others by comparison have been more "high tech"---tape recorders, 8 mm movie projectors, film strip projectors, slide projectors, overhead projectors. Today's newest "high tech" educational tools include computers and interactive software. As a result, the place of software in learning is to replace the traditional teaching

methods use in the classroom. Most experts in the field of educational computing (Rieber 1994; Lynch, 1990; Olson, 1988) would characterize computers as interaction and thus admit them a place within the relationship structure of the classroom learning environment, not just the physical environment.

Software Used in Teaching and Learning

Computer software is the set of instructions that are used to direct the computer hardware to perform the entire tasks require to manage the whole system and to process data. It is collection of programme. Arithmetic and logic form the basis of all computer software, (the instruction that tell computer what to do). The software is divided into system software and application software.

System software: These are programme which control the computer activities. It is designed to make the use of computer easy. They start computer, retain certain information on the computer among other functions e.g operating system such as window 2000, window XP, XP unlimited, Microsoft Vista among others.

Application software: These are program used for performing specific jobs or set of tasks of solving user's problem. This software has no direct effect on the utilization of the computer resources. Different application software are produced for different task or job carried out by man, e.g MS word, Excel, Access, Power point, Corel draw, Calculux, Desert Quest, Graph sight, maths blaster etc.

From a teaching perspective, they offer many advantages ranging from classroom management, recordkeeping, assessment, lesson planning, and lesson presentation. Computer software enables a teacher to accomplish all these tasks and more in less time than traditional methods.

The time saving features of databases, spreadsheets, desk top publishing, and word processing software allow teachers to organize their lessons, their classroom budgets, their communication with parents and assessment portfolios, and personal records. Once created and stored on hard drive, CD-ROM or flash drive, the files containing these materials are accessible and available for modifying and updating. Computers are extremely patient and uncritical when children make mistakes, marvelous characteristics which make them quite effective for young children's learning. Not only that, the newer interactive software allows young children to explore and experiment in a safe environment where there is no wrong answer and where a child may experience success, sometimes for the first time.

Many classification systems have been devised to describe the roles of computers in teaching and learning more importantly the teaching and learning of mathematics. For example, Schanks and Cleary (1995) focus on what they call "goal-directed" learning. They discuss the need to develop active learning environments in which students are encouraged to pursue intrinsically motivating goals which are related to intended learning outcomes. They recommend a range of software tools to support goal-directed with scenarios which are as follows;

Simulation-Base learning by Doing Tools

Tools that will enable people to "learning by doing" by placing them within simulated situations that replicate real world environments. Simulation software involves imitating real or imaginary situations using the computer to represent the situation using mathematical models with which the user interacts. With practice and experience, the learner is able to determine the factors and variables which the programmer has incorporated into the system and replay their performances to try out

possible improvements (Committee on Developments in the Science of Learning, 2000). Therefore, it was recommended that the following concepts could help in

Knowledge Organization and Retrievals Tools

Tools that can help organize the massive amounts of video, textual and machine readable data required. The internet is a good instrument that can be use to acquire more knowledge that is,

you can access the internet to acquire information that will widen your knowledge about a particular concept that is not clear enough.

Teaching Tools

Tools that will support different teaching methods which are appropriate in different contexts. Teachers need to develop the ability to judge whether or not a particular piece of software will provide the learning claimed by the publishers and whether this learning is relevant to their classroom and curriculum.

Tools to enhance thinking

The computer has the power to serve as a real think aid by asking pertinent questions that help the user clarify his thoughts. The reasoning ability of students can be enhance through the use software such as Desert Quest and a very good mathematical software.

Interaction Tools

There are many ways to enhance the process of interacting with a computer such as with natural language processing tools. For instance, try to identify topics that students often struggle with and see if you can use technology to present the content more effectively. Or use it to facilitate communication between students. Interactive white board is a good instrument that can help to achieve this.

A software package can not necessarily be classified by an educational application as it will depend on how the software is used. For example, a teacher could use a slideshow package as an electronic whiteboard application to present information on some topics. Alternatively, students could use the package as an application tool to present their own interpretation of information they have collected. Similarly many software packages may be used as tutorials or drill and practice depending on the background of the students. It is also important that the software and hardware work together so that the tasks are completed to a higher standard with less difficulty. Teachers should however be aware that some packages have been designed specifically for children, cares should be taken in applying software designed for adults to the needs of children. The computer should not be just to replace an overhead projector, textbooks or video recorder since these are only effective in non-interactive presentations.

Software Packages Used for Teaching

Software	Description (Use)
Word-processor (e.g. Ms word)	A word processor (more formally known as document preparation system) is used for the production (including composition, editing, formatting, and possibly printing) of any sort of printable material.
Spreadsheet (e.g. Ms Excel)	A spreadsheet simulates a paper worksheet. It displays multiple cells that together make up a grid consisting of rows and columns, each cell containing either alphanumeric text or numeric values.
Internet browser (e.g. Netscape)	Help students to access the internet and get more information on what they intend to find out.
Graph sight	Comprehensive 2D graphing utility with easy navigation
Calculux	Operation research software
Astro Algebra	It teaches algebra concepts and problem-solving skills. It includes several interactive activities for practicing.
Desert Quest	A mathematical problem solving adventure. This game increase the reasoning ability of the students.
Logical journey of the Zoombinies	Help children learn to order and group data and analyze patterns, observe, sort and test theories, perform three dimensional mapping, matching and grouping, and analyze, organize and sequence data.
E-mail software (e.g. Eudora)	This enable students to send quick mail.

Table 1

For a successful integration of ICT into the mathematics curriculum, it is essential to have knowledge of the existing software that is used by mathematics teachers. A survey carried out by

Forgasz & Prince (2002) found out the commonly used software to teach Mathematics as spreadsheets, word processing and Internet browsers. In the same survey, it was found that others that are used are

Geometer's sketchpads, CD-ROMs that accompanied mathematics textbooks, Graphmatica, Maths Blaster and other mathematics-specific software. Knowledge of the use of software on the part of the teachers is not the only criterion for integrating ICT into mathematics lessons; a sound pedagogical knowledge on how to integrate it is another critical success factor.

In a separate study, Jones (2004) found that seven barriers existed while integrating ICT into lessons. These barriers were (i) lack of confidence among teachers during integration, (ii) lack of access to resources, (iii) lack of time for the integration, (iv) lack of effective training, (v) facing technical problems while the software is in use, (vi) lack of personal access during lesson preparation and (vii) the age of the teachers.

Implication of Using Software

Potential	Implications for Teachers
Dynamic learning	Students may learn outside the teacher's own area of expertise, more difficult to direct and manage students learning
Students motivation	Students are easier to manage and direct towards the task. Students may be distracted by the computer from the tasks the teacher has intended.
Removing tedious tasks	More satisfying for teacher to direct less tedious tasks. Some teacher may prefer students to complete tedious routine tasks as busy work
Instruction to fit the learner	Relieving the teacher from needing to spend a lot of time with students who need extra practice, catch-up or extension work.
Independent learning	Learning may not direct itself toward the teacher's objectives. Additional coordination of the classroom, students and materials is required.

Table 2

Conclusion

In summary, Mathematics teacher needs to be aware of the software used in enhancing the teaching and learning process. ICT gives teacher access to information to support them in trying new strategies, thinking, reflecting on practice and engage with new material. Teachers need to continually work at updating their skills and knowledge in the operation and use of ICT. Therefore students and learners must not only have unhindered access to computers, the computers must be connected to the internet for the purpose of academic and general knowledge and not for any questionable and unethical practices.

Recommendations

In order to enhance learners' achievement in mathematics in Nigerian schools relative to the use of software in teaching and learning discussed in this paper, the following are recommended.

(1) Software serve as tool in teaching and learning of mathematics, therefore teachers should continually work at updating their skills and knowledge in the operation and use of computer software. Software, if effectively applied has a way of catching the attention and admiration of students which consequently will enhance the understanding of the students.

(2) The teacher should look out for software that best suit the topic he is presenting to the students. Mathematics teacher should not only depend on the use the generic software but also on mathematics specific software.

(3) School libraries should be equipped with the latest mathematics software. The libraries should also be connected to the internet at all time to enable students have access to information.

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