

Enhancing Classroom Instructions Through the Application of Bluetooth Technologies. A case of Schools in Kenya

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ABSTRACT

The Information Communication and Technology (ICT) revolution has led to data to be accessed on line or off line. Technology has made the world a global village where people communicate to each other effectively and efficiently regardless of their locations. It is clear that the communication landscape has changed and this change has infiltrated the school system being an open system. Bluetooth is an open wireless protocol for exchanging information and data over short distances from fixed and mobile devices. This technology if well integrated in our classroom settings can improve the efficiency of classroom instructions by the teachers. A case in point where this technology has born some fruit is a primary school in Kilgoris, Narok County in Kenya where students can access all the library books through their small PC gadgets called kindles, the students in this school enjoy learning and access to educational materials is not only enhanced but also improved. Currently, most of our teachers are still using the traditional methods of instruction that is, chalk and board against the use of digital devices like overhead projectors, laptops and PC tablets and Kindles. The situation is further aggravated with increased enrolment in both primary and secondary schools due to the governments' free primary and secondary education policy. This has made classroom instructions tedious to many teachers and learners are not quite involved in the learning process. This paper therefore seeks to explore the integration of Bluetooth technology to enhance classroom instruction by:

- i) Analyzing the difficulties facing current classroom instructions.
- ii) Examining how the Bluetooth technology can be integrated in a typical classroom instruction set up
- iii) Investigating the application of Bluetooth technologies in classroom set up.
- iv) Analyzing the challenges facing the adoption of Bluetooth technology in typical classroom.

Key words: Bluetooth Technologies, Classroom instructions,

Introduction: The Information Technology (IT) revolution has led to data to be accessed on line or offline. Technology has made the world a global village where people communicate to each other effectively and efficiently regardless of their locations. It is clear that the

communication landscape has changed [1] and with these changes, we have witnessed dramatic shifts in the way young people make meaning from texts of all kinds such as the multimodal texts. Multimodal in the global context is the communication in the widest sense, including the graphical, digital, electronic and artifact related. [2] argued that learners need a far wider range of affordances for meaning making in schooled settings and multimodal communication is a lens for understanding meaning by learners as it stretches out meaning.

With the advancement in technology, there has been need to digitalize learning systems. One of the tools being used in for this purpose is the "Bluetooth technology". This technology allows the scope for interact ants to connect with the likeminded others to feel the camaraderie of shared interests, to identify and solve problems in a collaborative approach and to experiment with ideas and ways of communicating. The authors are particularly indebted to those who have demonstrated the potential and use of Bluetooth technology in relation to its application in the education environment.

The use of technology in a classroom set up has various merits. Students learn at their own pace getting essential skills and knowledge and this helps to bridge the social gap amongst students. Students get enough time to practice with and without the teacher's support, as they get involved in the learning process with their peers. They also have an opportunity to apply skills and strategies in reading and writing meaningful text. Care should however be taken when students are exposed to this kind of technology. If not well regulated, some students may get so much involved with the new devices and not the content and new concepts they ought to learn with the assistance of this technology.

Difficulties teachers face during classroom instructions

Traditional methods of instruction which relied on oral discourse and verbal comprehension have proven ineffective for many students and are not cost effective. The methods no longer coincide with or meet the modern technological needs or nuances of the society.

The teacher has the responsibility to help the learners feel and be successful. Students often get bored and less interested in their school work. Some get bored during the instructional process and even doze in class since they are passive listeners. The learning process through school academic tasks and concepts become increasingly more abstract and many of them fall further behind because their level of mastery may be too rudimentary to allow for fluent learning. Facilities in most schools are quite inadequate vis a vis the number of the students currently enrolled for both primary and secondary education as a result of Free Primary Education policy introduced [2]. This policy saw

many learners scramble to schools to get the subsidized primary and secondary education, this left the few resources available in these schools overstretched and the problem of teacher shortage has persisted since then. Currently there is a shortfall of 76,000 teachers in both the primary and secondary schools in Kenya [2].

Some schools group students according to their ability without considering their individual differences. Ineffective instructional groupings where slow learners are mixed with fast learners and where instructional processes are outdated are common place in a typical Kenyan classroom. The task of delivering effective instruction and related services to a larger number of students are more difficult in such a classroom. Teachers face various discipline problems affecting delivery process especially where the teacher is the main contributor and students are mere passive listeners and observers. Similarly, some of the resources used may not be well adapted to the needs and abilities of the students for lack of innovation and interest.

The traditional classroom layout makes the amount of work space inadequate for students. The chalkboard in front of the classroom and sometimes others are at the sides or back forms the main teaching resource. Instructional delivery is a vital classroom activity and must be considered in the context of such factors as measures of desired student behavior and considering individual differences.

Integration of Bluetooth Technology in Classroom Instruction: Since students are well versed with the use of electronic devices in their everyday life, teachers must learn how to integrate this new electronic culture in teaching and learning. Currently, there is integration of technology to enhance the performance of teachers and learners during the learning process. The technology does not replace the teacher but helps him / her do a better job. The idea is that by showing students the content and processes every day, teachers also get to learn more by receiving constant reinforcement of ideas they have taught.

Instructional technology is based on using modern electronic communication devices like VCR, audiotapes, computers and electronic bulletin boards. These present a new resource which makes instruction come alive in the classroom. Students assume responsibility for their own learning especially if the material presented is stimulating. [3] and his colleagues have shown that combining visual contents greatly increases learning and retention. Students also learn best when they control the rate of learning through participation and involvement. The latest pedagogical tools from technology permit teachers to customize instruction to the needs and pace of individual students. Students do not need to be near the teacher for instruction to take place. One of the tools used to enhance effective teaching and learning is the Bluetooth technology.

History of Bluetooth Technology: The name Bluetooth comes from King Harald Blaatard (Bluetooth). A Danish who lived in the 10th century AD. He had dark hair thus the name Bluetooth meaning dark complexion. He brought Christianity to Scandinavia along with the unifying of Denmark and Norway. Bluetooth is an open wireless protocol for exchanging data over short distances from fixed and mobile devices, creating Personal Area Networks (PAN). It can connect several devices overcoming the problem of synchronization. Its protocol stack allows devices

to locate, connect and exchange data with each other and to execute interoperable, interactive applications against each other [7].

Bluetooth Basics: The key features of Bluetooth technology are robustness, low power consumption and low cost. A fundamental Bluetooth technology has the ability to simultaneously handle both data and voice transmissions. This enables users to enjoy variety of innovative solutions such as a hands free headset for voice call, printing and fax capabilities and synchronizing laptop and mobile phone applications.

This technology represents a wireless solution that is ubiquitous across a broad range of devices. It also unplugs the digital peripherals and makes a cable a thing of the past. These peripherals just need to be Bluetooth equipped. The features of this technology include:

- 2.4 Ghz frequency band is separated into hops allowing the ability to hop from one channel to another and add a stronger layer of security.
- It can network up to eight devices in a piconet,
- Devices do not need to be pointed to each other because the signals are omni-directional eliminating the need for line of sight at a range.
- Both synchronous and asynchronous applications are supported making it easy to use a variety of devices for many uses e.g. voice and internet.[8]

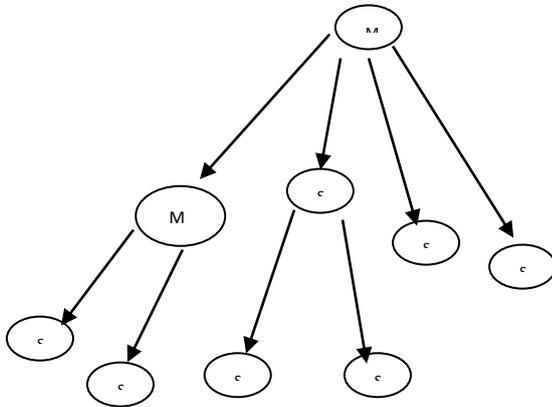
How Bluetooth Works: Bluetooth devices exist in small network configurations with the ability to operate as either master or slave. The specification allows the mechanism to switch their roles. The configuration can be single point, which has one master or one slave. Multi point configurations called piconet can have eight slaves clustered around a single master. A scatter net; a group of piconets hubbed via a single Bluetooth device acting as a master in one piconet and a slave in another piconet. The scatternet permits either larger coverage areas or a greater number of devices than a single piconet. The role of the master is to control the available bandwidth between slaves. It calculates and allocates how often to communicate with each slave and locks them out into the appropriate frequency hopping sequence. The master transmits control by dividing the network into a series of time slots among the members

A Bluetooth device does not have to be aware of the devices they are attaching to. There is a built in mechanism to inquire for devices, connect to them and once connected discover the services they possess in their database. The devices needing to connect proceed as follows:

- The master sends out an inquiry to discover a device available to connect to.
- Slaves make themselves discoverable by entering inquiry scan mode and listen for inquiry from a master.
- The slave responds to the master with a frequency Hop Synchronization Packet (FHS). The FHS contains information that is needed to

create a connection to the device including Bluetooth address and class of device.

- The master collects the FHS information and goes into page mode paging the device using the given address.
- The slave device will need to be in page scan mode to connect to a master. (Jones and Niel:6)



Master / Slave relationship

Application of the technology in a classroom setting

Classrooms fitted with technological devices are very crucial in the delivery of instructions. Interest in the extent to which texts and graphics can and do cross sites is by now quite well established. In school, a raft of concerns have focused on the extent to which out of school cultures are tried across to classroom learning in pursuit of expansive educational purposes. This has brought together the pedagogical aim of helping student become effective and powerful participants with the latest classroom appropriateness from the digital environment like the use of the Bluetooth technology. Maenpaa (2001) argues that teenagers use technology to share their lives to demonstrate that they are living in the same rhythm or wave with one's closest friends and peers. I have a sense of learners operating in constructed environments can benefit from these interactions

[4] Describe the ways in which teenagers keep in almost constant mobile phone contact with the close peer group and interact both within and beyond their immediate peer group. We see that teens share data and information amongst themselves and allow others to join them through participation. [5] Describes a process of enculturation where learners are formally instructed and learn through being part of a group. Where this is a focus, we can apply the Bluetooth technology in our classrooms. The Bluetooth technology is an exciting new way to communicate not only between handhelds and computers but with almost every device imaginable as long as its Bluetooth enabled. In a classroom, a teacher can use any Bluetooth enabled device. Bluetooth will redefine the way we experience connectivity and communicate. It will form a cordless telephony in the classroom. [6] argue that the communication landscape has changed and we need to positively change with the changes. Texts and graphics are constantly moving and changing amongst young students. One Bluetooth device can browse a file system, create or

delete files or folders or transfer files to and from shared resources, ideas and discovery to enhance learning. This inculcates in learners a sense of responsibility for their devices and sharing. It is a learner centered method of learning as the teacher only plays a supervisory role. These devices simultaneously handle both data and wire transmissions enabling users to enjoy variety of innovative solutions e.g. printing capabilities.

The applications of Bluetooth technology in classroom are quite varied depending on the availability of digital devices. Images can be transferred from a still or video camera to another device such as a computer for storage, editing and printing. No specific printer drivers are required for the printer to print from a Bluetooth enabled device. Instead, the printer has the capability to decipher the information sent to it so that it can produce the desired format. In case of excursions or any form of tour, students can take varied pictures and easily share with their peers and at any time. These enhance deeper understanding of the content learnt as they freely and easily relate what they are seeing to the subject matter. A Bluetooth device that has voice capability can act as a cordless phone when in the area of Bluetooth access point or other device that has a connection to voice network. This can help to explain a point regardless of the number of students. As long as a student is within a scatter net where he / she can still understand the teachers' instructions and respond accordingly. A sample of an ear device which is Bluetooth enabled is shown below.



A

headset can receive or send audio to a mobile phone or to a handheld device. This promotes discussion amongst the students themselves or the teacher. Classroom arrangement or over crowding in the class does not inhibit interaction since the devices makes it simpler and easier. One Bluetooth device can browse a file system, create or delete files or folders or transfer files or folders or transfer files to and from another Bluetooth device. Other devices like tablet PC can be used to improve the handwriting of students. It collects data about the words a student uses and he / she writes them hence the student learns the writing style and vocabulary. The Tablet PC recognizes the handwriting of every student and converts it into typed text. This helps the teacher to receive every student's personal work neatly.

Challenges facing the adoption of Bluetooth technology

Though the Bluetooth technology has several advantages and will be of great benefit if fully adopted in Kenyan schools, several challenges face its adoption and use in our schools.

Lack of Electricity: Most of these electronic devices use electric power and most of our schools do not have power

supply. In addition to that, teachers need to be trained on how to use these devices. Most teachers are not computer literate and the government needs to spend some money in the training of teachers.

Security: Security of the device is enhanced in various ways. To prevent others from seeing your device, you can set it to a non discoverable mode or you can only pair with a known device. The device has a pin for authentication and for this you can change the default pin to the pin only known to you. Generic access allows the discovery, link establishment and security levels between two devices regardless of the devices' manufacturer. Security should also be looked at in terms of theft. Such devices are expensive and hence prone to theft. Great care therefore ought to be taken to safeguard them.

Application: In a large class, learners can easily interact with the teacher through PC tablet and an ear device which is Bluetooth enabled can enhance communication especially to those with difficulty of hearing and the physically challenged (learners with special needs). With improved technology like the use of nanostation2, this can cover a wide area with a larger number of interactants.

Recommendations: The wireless world continues to grow as engineers develop faster, more robust technologies to free us from wires for greater simplicity, convenience and efficiency. From short range to long range, the wireless landscape has taken shape in our educational system in different ways. E- Learning has been enhanced across different countries and Kenya is not exceptional. We should embrace technology and integrate it to classroom instructions where applicable. Good classroom teaching is a vital part of the repertoire and we must explore its potential.

Conclusion: The wireless world continues to grow as engineers develop faster, more robust technologies to free us from wires for greater simplicity, convenience and efficiency. From short range to long range, the wireless landscape has taken shape in our educational system in different ways. E- Learning has been enhanced across different countries and Kenya is not exceptional. We should embrace technology and integrate it to classroom instructions where applicable. Good classroom teaching is a vital part of the repertoire and we must explore its potential. Technology presents images or information to the learner whereby he or she constructs new knowledge. Learning is viewed as active, constructive process where new information is extracted from the environment and integrated with prior knowledge. Uses of technological devices can enhance deeper understanding of concepts like pumping of blood by the heart. Classroom environment should be multi dimensional – so many different events and so many different related tasks to learning should be co-related for effective dissemination of knowledge. The students are different from each other, the pace at which they can work, the depth to which they can understand, the background knowledge and experience that they bring, their attitude and willingness to learn all vary. Different learners need different approaches for effective learning process. This makes the classroom attractive in appearance and functional.

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