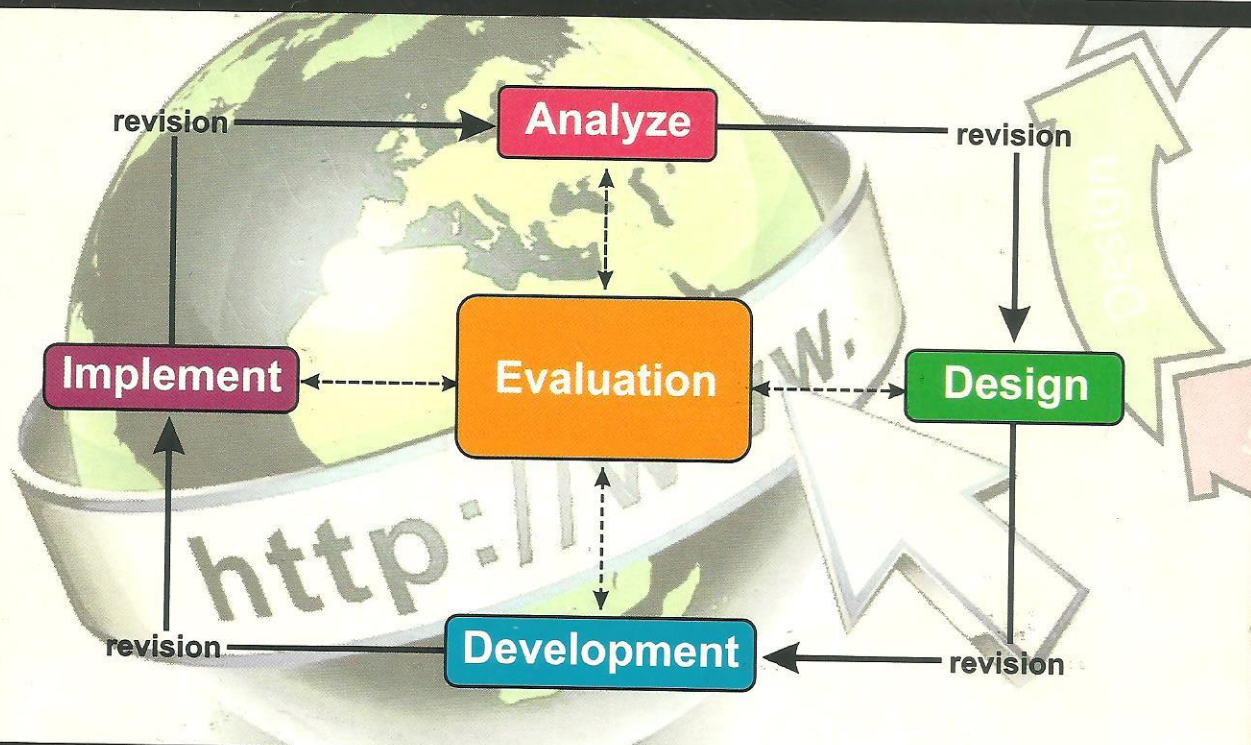


Critical **Issues** **IN** **EDUCATIONAL TECHNOLOGY**



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CHAPTER 20

EMERGING TECHNOLOGIES IN EDUCATION

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1.0 Objectives

After reading this chapter, you should be able to:

1. Discuss some emerging technologies like cloud computing, games and gamification, tablet computing, mobile learning, open content, learning analytics, three dimensional (3D) printing.
2. List and explain at least five examples of wearable technology tools.
3. Differentiate Massively Open Online Courses (MOOCs) and online learning.
4. Explain the following: cloud computing, tablet computing, virtual and remote laboratories.

2.0 Introduction

Technologies are rapidly evolving with vast evidences to suggest that education lags behind in adapting new technologies especially for teaching and learning. Emerging technologies will inevitably have impact on education as it cannot be separated from wider issues impacting on education and training. Emerging technologies have implication for future infrastructure requirement and may as well have impact on instructional organization. For the purpose of this paper, we explain emergent learning as a learning which arises out of the interaction between a number of people and resources; in which learners organize and determine with the process and to some extent the learning destinations both of which are unpredictable.

The interaction is in many senses self-organised but if nevertheless requires some constraint and structure. It may include virtual or physical networks or both. The debate on networks connectivism, learners' autonomy and even emergence often has normative overtones as if these are an end themselves.

3.0 Contents

3.1 Cloud Computing

Cloud computing is a computing term or metaphor that evolved in the late 2000s, based on utility and consumption of computer resources. Cloud computing involves deploying groups of remote servers and software networks that allow different kinds of data sources be uploaded for real time processing to generate computing results without the need

to store processed data on the cloud. Clouds can be classified as public, private or hybrid.

Cloud computing, or in simpler shorthand just "the cloud", also focuses on maximizing the effectiveness of the shared resources. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated per demand. This can work for allocating resources to users. For example, a cloud computer facility that serves European users during European business hours with a specific application (e.g., email) may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g., a web server). This approach should maximize the use of computing power thus reducing environmental damage as well since less power, air conditioning, rack space, etc. are required for a variety of functions. With cloud computing, multiple users can access a single server to retrieve and update their data without purchasing licenses for different applications (Cloud Computing, 2015).

Private cloud services are delivered from a business' data center to internal users. This model offers versatility and convenience, while preserving management, control and security. Internal customers may or may not be billed for services through IT chargeback. In the public cloud model, a third-party provider delivers the cloud service over the Internet. Public cloud services are sold on-demand, typically by the minute or the hour. Customers only pay for the CPU cycles, storage or bandwidth they consume. Leading public cloud providers include Amazon Web Services (AWS).

Hybrid cloud is a combination of public cloud services and on-premises private cloud – with orchestration and automation between the two. Companies can run mission-critical workloads or sensitive applications on the private cloud while using the public cloud for busy workloads that must scale on-demand. The goal of hybrid cloud is to create a unified, automated, scalable environment which takes advantage of all that a public cloud infrastructure can provide, while still maintaining control over mission-critical data (Cloud Computing, 2015).

3.2. Mobile Learning

In the past decade, e-learning was the state of the art for many universities and institutions. While many predicted that e-learning is the final solution for corporate training and university programs (Keegan, 2002), there has been a continuous evolution in wireless and mobile technologies. In the mid of 2005, the number of cellular phones per person, were more three times than PCs, and most of sophisticated phones have the processing power of a mid-1990s PC, and it is increasing (Georgiev, Georgiev, & Trajoysk, 2006). As the result, the number of mobile users increased rapidly and nowadays they are estimated to be 2 billion users. Besides, the advancements in wireless technologies play a major role in escalating the number worldwide mobile Internet subscribers who have a wireless access to various online resources through mobile devices (ARC Group, 2000).

Mobile learning (M-Learning) describes a new form of learning that merges e-learning with mobility. However, there is a common agreement between most of the authors and researchers that mobile learning is a new dimension of e-learning. For example, Milrad, (2003), explained e-learning as learning supported by digital tools and media, and also explained mobile learning as e-learning that uses mobile devices and wireless transmission. According to this, many similarities can be found when comparing mobile learning with e-learning.

First of all, it is obvious that both applications came to support and enhance the

learning experience by utilizing technology. Moreover, both of them provide common services such as the delivery of the learning content, supporting learners and providing quizzes and assessments. On the other hand, there are some differences between the two learning forms. Mobile learning is more flexible than e-learning; Mobile learning supports the learners mobility by offering really anytime and anywhere access to the learning content while in e-learning the mobility is constrained to the weight and the size of desktop or laptop computers. Furthermore, transport mobile devices have some capabilities that can be delivered with greater ease than any other electronic devices (Brown, 2003).

Audio synchronous communication can be simply delivered via mobile devices and with inexpensive costs. Mobile phones have some facility that makes them better than most personal computers. It has been designed to deliver voice. You can listen to, or even talk with, a real person. The mixture of both audio and text facilitates the delivery of certain types of learning content (Shepherd, 2001). In contrast of e-learning, mobile learning is always blended and it cannot be used as the main technique for learning but it can be an effective form that can be used in conjunction with the other learning forms to enhance and facilitate the learning process.

Therefore, this new form of learning is a heterogeneously experience that emerged as a result of social and technological forces; Mobile learning is formed by many social forces including the desire of individuals to choose when and where they learn and technological factors which are the driving force towards the adoption of mobile learning (Kramer, 2007). Through mobile learning, learning becomes more effective, interesting and convenience.

M-Learning Characteristics

As mentioned previously, mobile learning discriminates itself from the other learning by several characteristics. Chen, Kao, Sheu, and Chang (2002), presents six unique characteristics of mobile learning as follow:

1. Urgency of learning need: mobile learning can be used for an urgent matter of learning.
 2. Initiative of knowledge acquisition: the learner can access the learning materials on demand and the wireless application will provide the information to the learners upon his request.
 3. Mobility of learning: the large coverage of the wireless networks enabled the learning process to be performed at anytime and anywhere.
 4. Interactivity of the learning process: learner can easily communicate with his tutors, classmates, or other materials using the mobile devices.
 5. Situating of instructional activity: the learning activities can be adapted to fit the learner context.
 6. Integration of instructional content: integrating many information resources.
- Moreover, other characteristics include:
- a. Mobile learning is usually blended; Mobile learning doesn't intend to replace the other learning forms. It can be used as a supporting learning technique that increases the efficiency of the learning process in traditional learning or even in e-learning.
 - b. Mobile learning is related to many ethical issues such as: the learning material ownership and the student honesty.
 - c. Mobile learning technologies are friendly, cost effective and common among all of us.

- d. Mobile learning raises the learners' esteem by giving them the responsibility of managing their learning process.

However mobile learning is a promising field that takes into account three main aspects that could be explored, technology, learning context and learning content.

3.3. Tablet Computing

Relevance of tablet computing include but not limited to the following: Eases the building of personalized learning environments, learners can take and share notes; create to-do lists; store their files; and organize academic schedules. Supports universities in formulating strategies for textbooks and reading assignments, replaces cumbersome laboratory equipment for fieldwork.

Schools worldwide are undergoing an exciting, and sometimes challenging, metamorphosis as technology becomes an integral part of everyday teaching and learning. The impact is everywhere—from first graders exploring habitat videos on the Internet to twelfth graders collaborating on research with local or national experts using specialized software applications. For school administrators and IT managers, one decision stands out: What is the best teaching and learning platform? What kind of computing system will support the wide range of ages and activities, while being cost-effective, manageable, and secure? These education decision makers are discovering the affordable, versatile, Tablet PC (Carmitchel, 2015).

What distinguishes Tablet PCs from traditional notebooks or netbooks is their ability to adapt instantly from a keyboard-driven screen to a pen- or stylus-based Tablet. This flexibility widens the range of computer-based activity. The expanded capability makes Tablet PCs an important tool across the curriculum, supporting science, mathematics, and engineering coursework, in addition to providing the toolset for reading, writing, online research, and content creation and viewing. Students are using Tablet PCs to draw and annotate diagrams, solve math equations, design structures, and conduct field work.

Tablet PCs are designed for real classrooms and 21st century learning—from problem solving and critical thinking to content creation and collaboration. Full-featured, and with a versatile combination of keyboard and digital pen, Tablets support the full repertoire of learning and teaching, for example:

- a. **Language Arts:** Emergent readers can trace letters while hearing them enunciated. All grade levels can take notes, highlight and annotate reading assignments and worksheets, and create story and concept maps.
- b. **Math and Science:** Students can complete equations, create graphs and diagrams, predict trends, record observations in class or in the field, illustrate concepts, create models, unpack sophisticated diagrams pushed to Tablets by the teacher, and follow hot-links to deeper content.
- c. **Learning:** Tablet PCs supports improved retention, organization, capture of video/audio while taking notes, sharing class work, collaboration, and peer review.
- d. **Teaching:** Teachers can deliver curriculum through PPT* presentations, Word* docs, and spreadsheets; mark up digital class work and homework; pull in and annotate student work on-the-fly, demonstrating multiple solutions to the same problem.

- e. **Save Time and Money:** Teachers can use digital forms, convert digital notes to text without having to retype, and reduce paper, supply, and copying costs. All of this also supports learning continuity.
- f. **Access:** Teachers can access a wide range of free, compatible software applications for education.
- g. **Performance:** Tablet PCs help deliver an engaging learning experience with rich, multimedia digital content.

3.4. Massively Open Online Courses (MOOCs)

Here, learners of all ages, incomes, and levels of education are allowed to participate in a wide array of courses without being enrolled at a physical institution. Only the technologically insensitive would look at the growing popularity of MOOCs and will not acknowledge that technology has the potential to radically transform how education is delivered and the way we learn. The following are some of the tools use in MOOCs:

Pixenate: This tool has features like “red eye reduction”, “normalize” (improve color balance), “fill light” (lighten entire pic), “whiten teeth” and “colors tool” (lets you change brightness, saturation, and hue). But the real fun here is the “fun effects”, such as Lomo (add a soft, dark halo around photo), speech bubbles, snowflakes, a filtering tool, and more. You can order prints and products like t-shirts, mugs, etc., that incorporate your masterpiece.

Wet Floor Maker: This tool “turns your photos into cool reflecting images” - you can choose which axis to reflect on, the degree of reflection, and other options. **Mypictr:** This applet lets you upload a picture, select a section of it using a presized frame, then save it or email it. The idea is to give you a very easy way to create a profile picture for social networks, but you can do this very easily using Paint on a PC.

Roundpic: Roundpic automatically rounds the edges of a picture, but it's limited to 1 MB pictures. It also doesn't appear to offer any control over the way the rounding effect is applied. Pixenate does the same thing but provides some control over the degree of rounding, and also let's you fill the corners with color. You can actually create a multi-layered corner look by applying the technique a couple times.

Picasa: Google's photo editing and management tool offers functionality well beyond those cited earlier. It is free, but it has to be downloaded and installed. In addition to photo enhancement features, Picasa also let's you share photos online, create online photo albums, and more. Of course, there are also options to order products that incorporate your photos

Voki: Voki can be used to personalize some of the web sites created. For example, a Voki on blog can be used to send a greeting to students or to create a speaking avatar. Voki can also be used as part of a sub plan; if one is going to be out for the day, it can be used to send a message to students with goals for the day's class. Could also be used for reading instruction (record students reading aloud) and world language pronunciation exercises.

Prezi: Prezi is an app where you can create those cool visuals with images and text that zoom in to specific content elements and then back out again to see the bigger picture, and then zoom in again, etc. These have become popular in television commercials lately (Using mLearning and MOOCs, 2015).

Facebook in Your Lesson Plans and Teaching

Facebook is the most popular site on the Internet which can be leveraged in the

classroom in engaging and useful ways. Facebook has become such a ubiquitous part of our lives that it has evolved to be much more than a way to find out what happened or to share pictures of your friends. Many use Facebook to communicate and network with both friends and professional colleagues, and to learn about products, services, organizations and events.

Instagram in an Educational Context

Instagram is an online photo sharing and social networking service. It enables users to take pictures and apply digital filters to them and then share them on social networking sites. Instagram was launched in October 2010 by Kevin Systrom and Mark Krieger. The service has been immensely popular with people active on social networking. At present, Instagram has over 90 million users worldwide. Instagram supports all Apple products like iPhone, iPad, iPod and all camera phones having the Android operating system.

Pinboards to encourage Group Collaboration

Group collaboration is essential for completing some school assignments. Pinterest is excellent for group projects because all students in a group can share a pinboard on which they will pin all photos, videos and resources that have to do with their projects. Being able to share content in this way takes a lot of hassle out of completing tasks as a team because the group does not have to work out a meeting schedule to share their resources.

Twitter In the Classroom

These resources actually provide over 110 ideas for, and examples of, using Twitter in the classroom. There are a lot of articles containing examples and suggestions for using Twitter in instructional applications.

Embracing the Cell Phone in the Classroom with Text Messaging Assignments

The importance and prevalence of text messaging is certainly undeniable. A study in 2008 placed the monthly volume at over 75 billion. In a 2010 Pew Research report indicates that teens use texting on cell phones to communicate more than they use the voice calls or face to face communication, with 54% using text messaging to contact friends versus 38% calling, and just 33% communicating face-to-face (Using mLearning and MOOCs, 2015).

3.5. Open Content

Open content expands curricula with media-rich tools and texts that can be used and adapted to specific lessons. The flipped classroom model encourages more teachers to create videos and use shared media for students to explore outside of the classroom.

The Open Content website once defined Open Content as 'freely available for modification, use and redistribution under a license similar to those used by the Open Source / Free Software community'. However, such a definition would exclude the Open Content License (OPL) because that license forbade charging 'a fee for the open content itself', a right required by free and open source software licenses.

The term since shifted in meaning. Open Content "is licensed in a manner that provides users with free and perpetual permission to engage in the 5R activities." The 5Rs as put forward on the Open Content website as a framework for assessing the extent to which content is opened:

1. Retain - the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage)

2. Reuse - the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video)
3. Revise - the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language)
4. Remix - the right to combine the original or revised content with other open content to create something new (e.g., incorporate the content into a mashup)
5. Redistribute - the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend).

This broader definition distinguishes open content from open source software, since the latter must be available for commercial use by the public. However, it is similar to several definitions for open educational resources, which include resources under non-commercial and verbatim licenses. The Open Definition, which purports to define open content and open knowledge, draws heavily on the Open Source Definition; it preserves the limited sense of open content as liber content.

Podcasting

The word “podcasting” sounds like, and in fact is, a portmanteau of “iPod” and “broadcasting”, leading to the assumption that it is about broadcasting to iPods and similar devices. Wikipedia defines a podcast as being, “like a radio program except people can download a podcast to a portable media player (such as an iPod or other mp3 player) and listen to it at their convenience”. Anyone can create a podcast with a computer, internet connection, and recording device. Podcasting uses RSS feeds (the same mechanism used to distribute blog postings) for distribution/publication. Podcasts can also incorporate video (podcasts incorporating video are also referred to as “vidcasts” or “vodcasts”). So, a podcast is an audio or audio-video recording you can listen to live or on demand, and access via the Internet.

Potential uses for podcasting in education, one obvious use of podcasting in education is to create an archive of class lectures that students can listen to at their convenience. However, given the distinctive features of podcasting, its potential goes far beyond that. The uses of podcasting in educational settings including: news/updates; guest lectures; student-produced podcasts; interviews; short language lessons or other lessons focused on developing listening and speaking skills, and supplementary material such as speeches or music.

Flipped Classroom Resources

The prior chapter provides a wealth of existing content that can be useful in the flipped classroom context, but most teachers who are flipping course content wish to either create their own, or leverage existing content in a customized way. The two applications discussed in this section can facilitate this. Teachem is a Great Free Tool for Delivering Flipped Classroom Video Content Teachem is a free online web site that where one can easily turn YouTube videos into online classes that can be private or public. A variety of additional teaching and learning aids, such as Flash Cards and 'SmartNotes' round out the functionality to deliver a uniquely powerful tool for delivering flipped course content. Originally modelled off of their sister website focused on legal education, Lawline.com, the parent company started Teachem to provide this great, free functionality to teachers of all subjects.

Teachem started off with limited functionality to keep it simple and easy to adopt (in

contrast to ed.ted.com, for example, with some wonderful functionality available, but rather buggy performances). They are gradually, thoughtfully, building in additional functionality.

iPads in Education

The iPad has proven to be one of the quickest-to-catch-on technologies in education. With the release of the iPad 2 at the start of 2011, it was undeniable that Apple had raised the 'tablet' niche of computing device from wannabe to contender – tablets had been discussed for years, but in 2011, the iPad became a game changer. A growing number of schools have launched programs to provide iPads to students. There are many great applications available for free for the iPad (Defining the "Open" in Open Content, 2015).

3.6 Learning Analytics

Learning analytics is an emerging field in which sophisticated analytic tools are used to improve learning and education. It draws from, and is closely tied to, a series of other fields of study including business intelligence, web analytics, academic analytics, educational data mining, and action analytics. This includes all online education tools and some of them are succinctly described in this paper.

Social Learning Tools

The following are a couple of applications designed specifically for education that leverage social networking and workgroup collaboration elements. These tools also provide functionality similar to the Learning Management Systems that are commonly used in higher education.

Edmodo.com

Edmodo positions itself as a “private communication platform built for teachers and students”. The application's potential for instructional use is very high. Its education, specific orientation, and group-focused approach position it as a uniquely suited application for educational use, and it is very much worth checking out.

Room21

Room21 is a 21st Century Social Learning Platform. It is a Facebook-like environment designed for peer collaboration and to create Learning Communities online. The site is free and allows all members of the learning community – students, parents, teachers, and administrators, to become engaged in the process (Mirriahi, 2014).

3.6 Games and Gamification

Gamification enables experimenting with badging which is a platform to recognize informal learning experiences that are not conveyed through credit hours or grade point average. The gamification of education and cognitive, social, and emotional learning benefits learning and developers of learning resources for children and schools.

The current trend towards the increased use of games and game mechanics in instructional situations could probably have been foreseen quite some years ago. As a wider variety and higher quality of educational games have been produced, it is really no surprise that educationists have gravitated towards further use of them as tools in the learning environment. Lee (2011) emphasised that gamification can be applied to three different learning areas – namely, those covering 'cognitive', 'emotional' and 'social' needs of students.

Free Educational Game Sites

The following were some of the sites with free educational games selected. In addition to a brief overview of each site, attempt has been made to define the grade range that each site is applicable to. Most of the sites listed here are geared towards K-12 (with many leaning towards K-6 or so), but some do have fun games that will challenge the higher students and adults as well.

- i. **Funbrain (Grades K through 8):** This popular site from Pearson Education features 'Arcades' specific to Math and Reading, along with the 'Classic Funbrain' games such as Math Baseball and Grammar Gorillas. Funbrain also has resources specifically for teachers, organized on this Teacher's home page.
- ii. **Discovery.com's Games (Grades 3 and up):** Dozens of activities, organized into 4 categories: Games, Quizzes, Puzzles, and Interactives. This is a high quality site, and it was recommended by several instructors in the children's classes. Attempt should be made to try out some of these games, and the site which is rich with informative and fun content.
- iii. **Sheppard Software (All Ages):** This site provides a wealth of free games, puzzles, quizzes, and more. An impressive, rich resource of fun educational games and activities. No registration required
- iv. **FunSchool (pre-K through Grade 6):** Going to the Parents & Teachers section on this site, the games are grouped by Preschool, Kindergarten & 1st Grade, 2nd & 3rd, 4th and 5th. The site offers more than 300 interactive games and activities that are fun and easy to use. Activities include matching numbers and shapes for pre-schoolers. Geography, math and history for third to the sixth graders.
- v. **National Geographic Channel's Games Site (Grades 3 upward):** This site features a variety of games and interactives and leans towards various science and history based adventures and activities, rather than the traditional subjects-specific types of games on many other sites.
- vi. **Primary Games (Grades K through 6):** Lots of fun games here, covering common subjects like Math, Language Arts, Social Studies, Science, and more. Educational Games (and Simulations) on NobelPrize.org (Grades 6 upward). As stated on the site, "These games and simulations, based on Nobel Prize-awarded achievements, will teach and inspire. This is one of the higher end sites in terms of the level of content. Challenging fun for middle school students, high schoolers, college students, and adults.
- vii. **Prongo (pre-K through middle school):** Here the games are divided by age level (3-6, 6-9, 9-12). This is a site with a dozen or more games in each category.
- viii. **Childtopia (pre-K to 6):** This site has versions in 5 languages, and 9 categories of activities, including Games, Learn to Draw, Listen and Reading Comprehension, Learn to Draw the Numbers, and so on.

3.7 Three Dimensional (3D) Printing

The 3D printing technology made its way to the technological world in the year 1986, but not gains importance until 1990. It was not that popular except in engineering, architecture and manufacturing fields.

3D printing is also known as desktop fabrication; it can form any material that can be obtained as a powder. For creating an object you need a digital 3D-model. You can scan a set of 3D images, or draw it using computer-assisted design or CAD software. You can also

download them from internet. The digital 3D-model is usually saved in Standard Tessellation Language (STL) format and then sent to the printer. One of the most important applications of 3D printing is in the medical industry. With 3D printing, surgeons can produce mockups of parts of their patient's body which needs to be operated upon. 3D printing makes it possible to make a part from scratch in just hours. It allows designers and developers to go from flat screen to exact part. Nowadays almost everything from aerospace components to toys are getting built with the help of 3D printers.

3D printing can provide great savings on assembly costs because it can print already assembled products. With 3D printing, companies can now experiment with new ideas and numerous design iterations with no extensive time or tooling expense. They can decide if product concepts are worth to allocate additional resources. 3D printing could even challenge mass production method in the future. 3D printing is going to impact so many industries, such as automotive, medical, business & industrial equipment, education, architecture, and consumer-product industries.

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the entire object is created. Each of these layers can be seen as a thinly sliced horizontal cross-section of the eventual object.

Working Principle of a 3D Printing

It all starts with making a virtual design of the object you want to create. This virtual design is made in a CAD (Computer Aided Design) file using a 3D modeling program (for the creation of a totally new object) or with the use of a 3D scanner (to copy an existing object). This scanner makes a 3D digital copy of an object and puts it into a 3D modeling program.

To prepare the digital file created in a 3D modeling program for printing, the software slices the final model into hundreds or thousands of horizontal layers. When this prepared file is uploaded in the 3D printer, the printer creates the object layer by layer. The 3D printer reads every slice (or 2D image) and proceeds to create the object blending each layer together with no sign of the layering visible, resulting in one three dimensional object.

Methods and Technologies of 3D Printing

Not all 3D printers use the same technology to realize their objects. There are several ways to do it and all those available as of 2012 were additive, differing mainly in the way layers are built to create the final object. Some methods use melting or softening material to produce the layers. Selective laser sintering (SLS) and fused deposition modeling (FDM) are the most common technologies using this way of printing. Another method of printing is to lay liquid materials that are cured with different technologies. The most common technology using this method is called stereolithography (SLA).

3.8 Virtual and Remote Laboratories

The online schools rely on virtual and remote laboratories for much of their STEM labs and activities. Virtual and remote laboratories reflect a movement among education institutions to make the equipment and elements of a physical science laboratory more easily available to learners from any location, via the web. This allows greater flexibility, repetition, and safety when students perform experiments.

Virtual laboratories are web applications that emulate the operation of real

laboratories and enable students to practice in a “safe” environment before using real, physical components. Examples include an optical networking virtual lab and a virtual lab for programmable logic controllers. Students can typically access virtual labs 24/7, from wherever they are, and run the same experiments over and over again. Some emerging virtual lab platforms also incorporate reporting templates that populate with the results of the experiments so that students and teachers can easily review the outcomes. Remote laboratories provide a virtual interface to a real, physical laboratory.

Distance Labs

A Distance Lab is a web platform offering any kind of online accessible experiment. This can be a remote or a virtual lab. The term Distance Lab is used for a web platform including several labs accompanied by booking and user management modules.

Remote Labs

A remote lab (or online lab) enables actors (such as students or employees) to carry out experiments over the Internet which are normally performed in real-time physical studies in educational laboratories. Compared to a normal laboratory, additional equipment is needed to prepare traditional labs for online access.

3.9 Wearable Technology

Wearable technology allows more open communication between students and educators through tools that send information via text, e-mail, and social networks based on voice commands, gestures, etc. (i.e. “Project Glass” by Google). But unfortunately too often one forgets to train the most important organ in the body: the brain. It defines one as individuals and makes one human.

Brain Link

Brain Link is a headset that reads your brain activity. It connects with smartphones or tablets via Bluetooth. One can choose from 20 apps games that will help train one focus or help one stay longer in a meditating state. The device is great for children that have problems with staying concentrated because it allows parents to see the child’s progress by using a cloud brainwave database.

Emerging Interactive Media

The development of the Internet is fostering the creation and proliferation of emerging interactive media, such as the Worldwide Web and shared virtual environments. A medium is in part a channel for conveying content; as the Internet increasingly pervades society, university instructors can readily reach extensive, remote resources and audiences’ on-demand, just-in-time. Just as important, however, a medium is a representational container enabling new types of messages (e.g., sometimes a picture is worth a thousand words). Since expression and communication are based on representations such as language and imagery, the process of learning is enhanced by broadening the types of instructional messages students and faculty can exchange (Dede, 1996).

Blogs & Blogging Resources

There are many websites on the Internet where educators can write their own blogs. One way to do this is to become part of an organization that provides its members a place to blog, such as Educause, or Classroom 2.0. Another way to write your own blog is to set yourself up on one of the many sites that are designed to allow you to create your own domain or subdomain, where the content is entirely yours. While this may sound a little daunting to

newbies, it really isn't too hard to get started. Below are examples of such sites, both of which are free, and are very widely used.

Cloud Apps

Following are a few sections of content that discuss a variety of cloud apps such as file sharing tools and other applications that can be great for collaborating and for being able to access content from multiple devices. Students in the Cloud – How Google Drive has Nullified Missing Homework Excuses Contributed by Sara Garcia, a senior and Creative Writing major at California State University Long Beach. Discovery of Google Drive came with the realization that technology has taken a huge leap in college-aged generation. We have overcome floppy-disks, flew past CDs.

The one drawback was that many times, teachers used school-issued software to share these files online. This software was frequently buggy and/or difficult to use. There are several better ways to share files with students. The following online storage tools use the power of the cloud to give you free storage and simple file sharing. The following file sharing tools are free to use up to a certain limit. Each tool offers a couple gigs of free storage space that you can use to post things online and to receive documents from students. If you work primarily with text documents, presentations and spreadsheets, a few free gigs will last a long time.

a. **Dropbox www.dropbox.com**

Dropbox is a big player in the online file storage game thanks to its simple setup and powerful features. The file sharing options for Dropbox are flexible and make it easy to share documents with students. Just create a free Dropbox account and specify a folder on your computer. Any file that you store within that folder is saved online.

b. **Facebook www.facebook.com**

Facebook recently announced that it has added file a file sharing feature for all Facebook Groups. This feature allows you to upload and share files with all group members. Every file type except for music and .exe files can be posted to the group for public downloads. The only limit is that files must be 25 MB or smaller.

c. **Box.com www.box.com**

Box.com is a major competitor to Dropbox and offers a similar set of features. You can sign up for a Box.com account and get 5 GB free. Any file that you store in your Box.com account can then be shared by generating custom download links. Give those links to your students via e-mail and they can download any file with ease.

d. **SugarSync www.sugarsync.com**

SugarSync is a popular alternative to Dropbox and Box.com. This storage company offers 5 GB of free storage space with full access to all the features. Free accounts never expire and you won't be bugged to upgrade. If you never go over your 5 GB of storage space, you will never have to pay to use SugarSync. If you do decide to upgrade, you can get 30 GB of storage space for \$4.99 a month.

Both file sharing and folder sharing are supported by SugarSync. You can share any file by uploading it to your account, right-clicking on the file and generating a direct download link. Entire folders can also be shared. As the owner of the account, you can customize the permissions so that students are either restricted to downloading files or are able to upload their own files. You can also password-protect folders and files.

e. **Mind Mapping & Idea Mapping Tools**

This first set of tools lends themselves readily to brainstorming and other collaborative efforts. There are dozens of applications on the Internet that fall into this group. Here are a few sites focused on the use of internet technologies in education: Bubble.us, Mindmeister.com, and Mindmapper.com.

- f. **Bubbl.us** (note that this is spelled correctly – there is no “e”). This free tool allows users to easily create bubble maps, which can be exported in various formats, saved (by exporting and re-importing them in an appropriate format), and edited collaboratively. It is very easy to use. There was no apparent “help” tool, available at blog.bubbl.us. However, students were very excited about doing this. The boys loved how the bubbles exploded when you deleted them, and the girls loved the colours. However, the thing they seemed most interested in was the fact that they could network.
- g. **Mindmeister.com** Mindmeister appears to provide similar functionality to Bubbl.us, for a fee. A free 30 day trial is provided, and for academic users there is a highly reduced fee, and a custom subdomain can be licensed. Mindmeister has received a number of awards. “Demogirl.com” has made this brief (3 minute) video available to provide some quick insight into this application.
- h. **Mindmapper.com** This is another application that charges, but also provides a free trial, and a reduced fee for academic use. This is an impressive looking site, with an array of offerings, support, FAQs, and much more. The product comes in professional, standard, and academic versions, as well as MindMapper Jr. for kids. If you want to try this category of software out, you can hardly go wrong with Bubbl.us. To investigate this category of application even further, Wikipedia's list of mind mapping software is a great resource.
- i. **Collaborative Documents**
Google Docs has become very popular (in 2012 Google Docs transitioned to a subset of Google Drive), and Zoho Office Suite is a great alternative to the Google offering. Google Docs/Drive (drive.google.com). You must create a Google Account in order to use Google Drive, but once that is done, sharing and collaboratively editing documents is very easy. Google Drive offers word processing documents, spreadsheets, presentations, and forms (which appear to actually be for surveys). Naturally, the use of each of these tools differs in various ways from other tools (such as the ubiquitous Microsoft Office), but it is not too hard to learn the different command sets. Advanced functions can be tougher to figure out, or may simply not be available. There is extensive help available at <http://support.google.com/drive/>.

4.0 Summary

The above emerging technologies in education are practiced around the globe particularly in the developed countries. Looking at the Nigerian educational systems the writers conclude that Nigeria is still far from integrating some of these technologies. It is not realistic therefore to disregard such technologies and attained the educational standard dreamt about. Some of the major problem for this set back is lack of power supply to run stable internet facilities, and where it is available the phobia of the unknown by the lecturers and students is also a great hindrance in using these technologies. Change is inevitable and Nigeria educational system must adapt change in order to achieve the educational goals for the upcoming generation.

5.0 SELF-ASSESSMENT EXERCISES

1. (a) Technology is dynamic in nature. Explain
(b) The place and role of technologies in education cannot be undermined. Justify this statement.
2. Write meaningful notes on any three from the following:
 - i. Mobile Learning
 - ii. Cloud Computing
 - iii. Tablet Computing
 - iv. Open Content
 - v. Massively Open Online Courses (MOOCs)
3. Advance various reasons why we choose Tablet PCs (at least five)
4. Describe how Facebook could be used to prepare a lesson plan that would be used in teaching and learning.
5. Open Content is licensed in a manner that provides users with free and perpetual permission to engage in the 5R activities. List and explain the 5Rs.
6. Distinguish very clearly between Open Content and Open Source software.
7. Explain the following in detail:
(a) Podcasting (b) Flipped Classroom (c) ipads in education
8. What do you understand by Gamification. Mention and explain at least five free education game sites.

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