MUHAMMAD IMRAN	EDU430 - ICT in Education
Lectures no. 1 to 6. (topics1-30)	QUIZ NO 1
MCQs (58)	30-12, 2020 to 01-12, 2020

1. ……is a device used for sound creation and production by means of computer speakers_____ **Soundcard**
2. 1 GB equal to _____**1024 MB**
3. …….drive is used for reading CD media. _____ **CD-ROM**
4. (HTML) stands for which of the following?_____ **Hyper Text Markup Language**
5. ……. Which of the following describes a manner in which communication between devices is defined_____ **Protocol**
6. Network port is used for connecting computers to which of the following_____ **network**.
7. Currently, the capacity of one layer is Blu-ray disc (BD)- the successor to DVD, between _____**27 GB and 33 GB**
8. Which of the following is not a Principles of Teaching Aids?_____ **management**
9. Which key deletes the characters to the left of the cursor_____ **Back space**
10. ……..are the physical tools used to convey information in the classroom. _____ **Teaching aids**
11. You can move the insertion point in a table_____ **All of the above**
12. Which of the following is responsible for image processing and displaying it on a monitor?_____ **graphics card**
13. _____ is the first hypertext document to be shown when a user follows a link to the web server._____ **Home Page**
14. A table _____ **is a grid organized in columns and rows**
15. Which of the following depends on the strength of graphics processor and memory of graphic card?_____ **image quality**
16. A program which is located in a separate ROM on the motherboard, and defines, as the name suggests, ----------._____ **BIOS**
17. Which of the following retains the information it's storing when the power to the system is turned off?_____**ROM**
18. The word wrap feature _____ _____**Automatically moves text to the next line when necessary**
19. Transfer of information from one place to another through different electronic and optical equipment is term as _____ **flow of information**
20. The following tool bars display in the word application window by default___ **Formatting tool bar**
21. …… is used for connecting computers and audio-video devices _____ **Firmware**
22. Which of the following is a small capacity memory which allows quick access to data _____ **Cache**
23. Image quality depends on the strength of …. components graphics _____**processor and memory**
24. Which of the following drive is used for reading CD media. _____ **CD-ROM**
25. Which of the following port is used to connect a mouse _____ **Universal Serial Bus**
26. . is a programme that allows a user to display and interact with a 'hypertext' documents _____**Web Browser**
27. Which of the following has the aim to transform a man and his personality?_____ **Teaching**
28. In MS word for what dose ruler help_____ _____**ALL**
29. Which of the following port is used for connecting a local printer_____ **Parallel port**
30. Which of the following is used for connecting computers and audio-video devices (digital cameras, etc.). _____ **Firmware**
31. 1 MB (megabyte)- …….(approximately) _____**1024 KB**
32. Which of the following is the basic unit used to measure the amount of information_____ **Bit**
33. According to COBUN 1968 what percentage of information can a person remember _____**20**
34. Memory card is a type of ……memory used to store data in digital cameras, cell phones, MP3 players etc _____ **flash**
35. Using find command in MS word you can search _____ **ALL**

36. a collection of direct links to predefined web pages which are stored in your web browser can be termed as which of the following _____**Bookmarks**
37. Transferring of a file from another computer to your own computer is which of the following? _____**DOWNLADING**
38. ------ enables computers to communicate via telephone lines. They connect computers to the Internet…_____ **Modem**
39. DVD drive is used for reading DVD discs. DVD disc capacity ranges from ----- to ----- ._____ **from 4.7 to 18GB**.
40. To move the cursor page to page of documents._____ **both of the above**
41. …..may be associated in the preparation of teaching aids _____ **Students**
42. …..area networks are networks with in a single building or campus or up to a few kilometers in size._____ **Local**
43. The main function of TEACHING is to preserve and protect the old values, customs, beliefs, traditions, etc. is according to which function of teaching_____ **Preservative**
44. Which key or key combination will move the insertion point to the bottom of your docoments_____ **Ctrl+End**
45. World Wide Web invented by_____ **Tim Berner Lee**
46. Which of the following is A self-learning technique, usually offline/online, involving interaction of the student with programmed instructional materials_____ **Computer Assisted Instruction**
47. Internal or private network of an organization based on internet technology (such as hypertext and protocols) and accessed over the internet is called which of the following _____ **Intranet**
48. ….are the physical tools used to convey information in the classroom_____ **Teaching aids**
49. ICT is concerned with the storage, retrieval, manipulation, transmission or reception of …..data_____ **digital**
50. Through his thought experiment imagined black holes through the relevant mathematics_____ **Einstein**
51. Most important piece of hardware_____ **motherboard**
52. …..is a modern system for annotating a document in a way that is distinguishable from the text. _____ **Markup language**
53. MS office provides help many ways. Which of these are closer to the answer_ **All of the above**
54. Metropolitan Area Network is an extension which of the following _____**LANs**.
55. Memorization and understanding are both components of the ….process._____ **learning**
56. Network port is used for connecting computers to which of the following_____ **network**.
57. Mx word 2007 allows creation of what type of documents by default_____ **DOC**
58. ATM means _____ **automated teller machine**

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HANDOUTS TOPIC NO 1 TO 227

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EDU430 ICT in Education

Handouts and Additional Material

Chapter 1 My Story-My School

Topic 1 Formative Years

Since antiquity knowledge has passed from generation to generation through stories. We all have stories to tell. To commence with I, felt my story might have some utility. Maybe it can provide some insights into the role of technology in education? What do we mean by pedagogy and the science of learning? How the two configure in relation to technology and integration into education? How has the classroom evolved and technology incorporated?

I remember my aunt who was a professor, author of numerous articles and few books, sitting beside her typewrite and researching her work. The click clack of the keys remains with me today. These were the times of romantic early and mid-sixties - The US invasion of Vietnam and the daily carpet bombing on Hanoi used to be the first news on the BBC. My aunt was extremely active in writing articles against the super power who invaded a small country for no reason - there was no Osama Bin Laden hiding in the North Vietnam. Now she writes her articles against the invasion of Iraq and Libya using a word processor. These days the computer has been incorporated in most classrooms but does it act a little more than a word processor with some research component? The answer sadly is no – the classroom may appear different yet for the most part remains the same.

Definition of ICT

ICT is concerned with the storage, retrieval, manipulation, transmission or reception of

digital data.

Communication Technology

- Communication Technology implies the knowledge, skills and understanding needed to exchange information verbally or nonverbally.
- It is processing of information in terms of accessing information, decoding information and sending it via a medium.
- Communication Technology is the electronic systems used for communication between individuals or groups.

Topic 2 The Story of My Education

This is then the story of my education. I was an only child and father (who was a senior officer in the Pakistan Army) passed away, only a year after birth. The responsibility of my upbringing fell solely on my mother. We resided in Multan with my maternal family. The question of education was a critical one, since we had no personal resources it was imperative that I acquire a good education and look after my family. Being the sole child and much loved my schooling started a little later than usual and initially I was educated at home.

When I started my home education; I had great difficulty with English. A solution was proposed by my aunts and my mother: my grandfather would teach me. He was a professor of English and it was said about him that he had no peers in his field. I was repeatedly told how lucky I was that my grandfather would teach me English. While my grandfather taught me English, a local preacher was employed to teach me recitation on my mother's insistence.

The combined learning experience was tremendously traumatic. My grandfather would sit in our veranda overlooking our back garden and I started avoiding going in the veranda. If I needed to go to the back garden I hide behind my mother's legs. If this was being lucky I shuddered to think what unlucky would be!

Why was this experience so painful for me? My maiden encounter with English commenced through the Radiant Reading books. These books, as far as English teaching went were very good and I believe remained the books of choice for many years to come in so many schools. The problem was that they were designed for people with an English background, i.e. their mother tongue was English. Despite the fact that I had mastered the English alphabet and knew the words; when it came to reading and stories I could not understand. I had tremendous difficulty in learning since I was unable to comprehend - for me making meaning of what I was studying was essential - Now I see several experts of pedagogy insisting that deep learning takes place only when you relate it to your experiences - you make sense out of it?

Memorization and understanding are both components of the learning process. While memorization is a critical part of learning, it is only a small part. Without comprehension, and only memorization, there is no understanding. Comprehension is derived from how particular information is related or understood by a person in a personal context – it is experiential in nature. Having learnt a little about Pedagogy now, I realized that our brain is wired to learn in a particular manner. We learn through association to an experience or context which we have gone through. If you try to teach and there is no association this leads to an inability to learn. This, I now understand, was why my early learning experience was so painful. Was Radiant Reading the right methodology for learning English? Later we will discuss in detail what pedagogy should be applied for learner like me and how can technology assist in the process

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. **Information and Communication Technology**

"ICT is defined, as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information" (Mangal, 1997).

Characteristics of ICT

- ICT is the integration of Hardware and Software Technology.
- ICT fosters the dissemination of information and knowledge.
- The nature of ICT is digital and virtual.
- ICT is global, anywhere, any time.
- ICT is a key enabler in the creation of networks.

Topic 3 School and Early Challenges

Having completed home schooling my story turns to my first school. I was enrolled in Muslim High School in Multan. A private school, supported through charitable donations. The school's business model was such that in the English medium primary classes the fees were higher and tapered off as you progressed to high school. While in the Urdu medium counterpart of the primary school the fees were negligible. Here we discuss the school's business model since these days with the aid of technology we can alter these models. Allowing us to creating educational opportunities for the underprivileged, which did not exist earlier?

It was in the third grade that I faced my next educational challenge, involving Urdu penmanship. In comparison to English where writing meant the current phonetic placement of alphabets, Urdu was a much more complex proposition. Apart from the correct conjoining of alphabet, the placement of accents, indicating the proper pronunciation, proved hard for me to grasp. Added to this was the fact that some knowledge of Arabic and other source language was also needed. For instance when writing a prophets name, it is followed peace be upon him is used. This is written in Arabic and in Arabic style. Things came to head in the third standard, when my teacher called my mother and told her that things could not continue in this manner. Seeing my difficulty my mother told me to that I had to correctly

learn the words and then joining them would not be such a problem. Similarly, for the Arabic honorific, she told me to use an abbreviation, instead of the entire phrase. It was with great difficulty that I progressed.

In those we had assessments on a daily basis. Teachers had sufficient time to pay individual attention to each student and to be able to check these assessments on a daily basis.

The teachers were motivated and the student body small enough to allow individual attention. If this is not the case then we will look at alternate pedagogy and technology which can engage students and provide them with the required attention.

Finally, it was time for Urdu penmanship assessment. Having finished my paper, I glanced at a class fellow's paper and noticed that apart from his beautiful handwriting he had used to the entire phrase (peace be upon him) in Arabic with all the appropriate accents. That was the probable last straw and I just tore my exam sheet and left. I never forgot the incident. It happened that I was traveling by bus and met the same person; whom I recognized instantly and even remembered his name after a forty year interlude. He was quite shocked and had no recollection of me.

Two lessons derive from this story, the power of association and the requirement of a particular subject and how its learning can be improved. Memorization is integral to the learning process. Marvin Minsky in the Society of Brains, a very interesting book on the science of a brain, states that the critical thing is association. We only remember things by which we are directly affected, and tend to forget the rest. If we started to retain all our past experience we would be solely lost in them. We will then look at how we can engage the student and create learning which will be retained. Similarly, we have to consider how technology can assist us in learning subjects like penmanship.

Computer Informatics

- Informatics' is the study of information processing
- Educational Informatics is the study of the application of digital technologies and techniques to the use and communication of information in learning and education.
- Educational Informatics is the development, use, and evaluation of digital systems that use pedagogical knowledge to engage in or facilitate resource discovery in order to support learning.
- Studying the techniques and impact of 'digital technologies' within the context of the 'use and communication of information' in educational settings.
- Educational informatics represents the intersection of three disciplines: teaching and learning, information science, and information communication technologies (ICTs)

Computer Network

Inter connected collection of autonomous computers.

Topic 4 The Power of Association

My tussle with education had not ended. In the fourth standards mathematics proved to be another subject with which I had difficulty. Concepts such as Zouazaf-e-Aqal & AdayAzam (???) translated into Urdu had no meaning for me. The learning process entails understanding something and remembering it, i.e. *Memorization;* the second step is to *DO* and *the third Act is to Connect*. The *Do involves solving a problem through certain procedure* and *its application.* But most crucially pedagogists maintain that long term learning involves connecting this to real life in a personal context. If there is no comprehension of the term or the applicable procedure employed how is a concept be understood? These Urdu terms are not used in everyday language and even those extremely proficient in it never utilize these terms. What sense does it make to a fourth standard student? While Urdu should be utilized a means to of teaching it, in fact it is my medium of choice, but terms used should be ones that make sense to student and real life connectivity to the concept being explained.

Computer Networking

- Copper wire
- Microwaves
- Fiber optics
- Communication satellites

Local Area Network and its Characteristics

Local area networks are networks with in a single building or campus or up to a few kilometers in size.

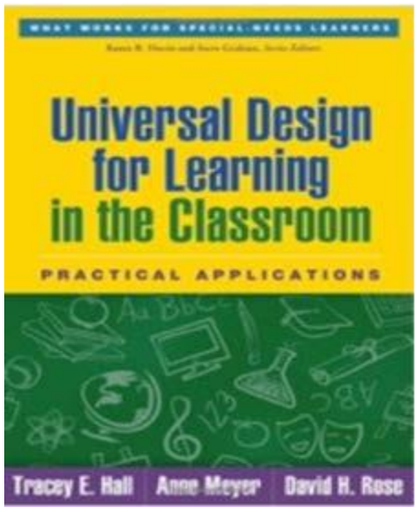
Characteristics of LAN

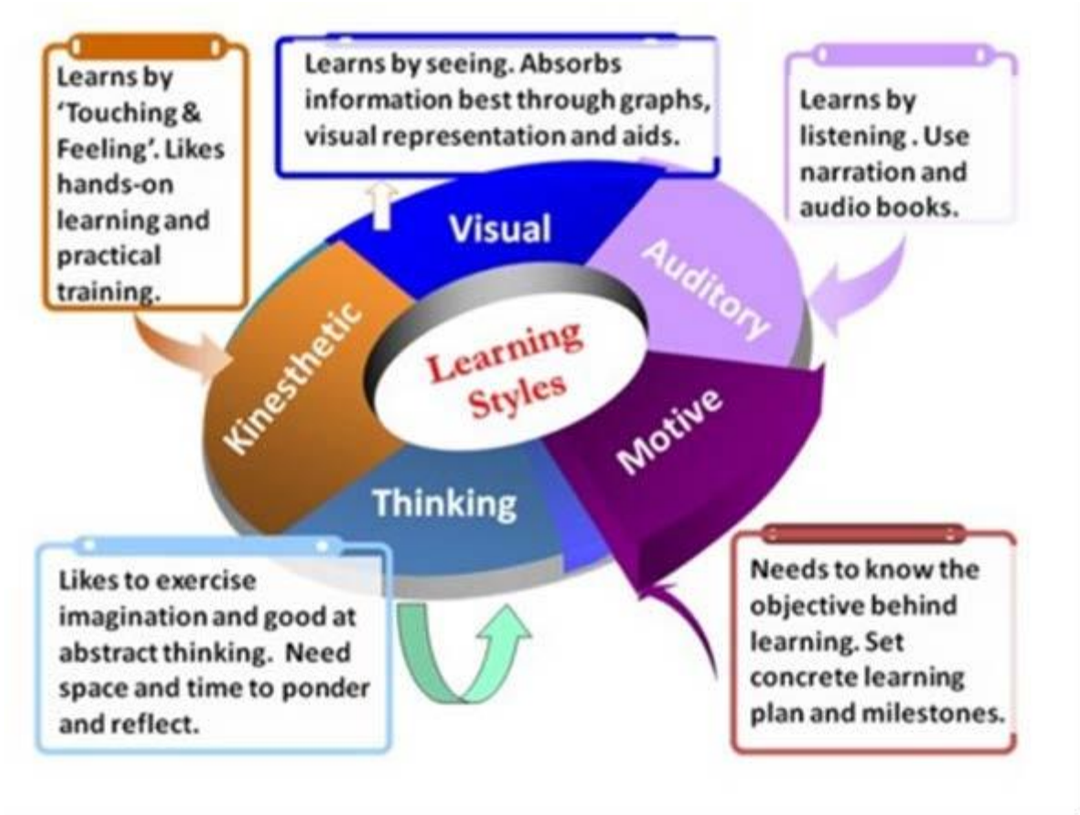
- Low delay
- Very few errors
- Higher speed
- LANs are restricted in size (Functions within 10 KMs).
- Transmission time is bounded.
- Simple network management

Topic 5 Different Pedagogy for Different Students

Due to these two concepts I had tremendous problems with mathematics. Things came to head when my mother was called to school and told that things could not proceed in this fashion. What was surprising about my school, and here we are talking about the sixties, was the fact that they understood that an alternate teaching methodology was required for weaker students. With this in mind they split the class in two sections; those with more understanding of mathematics, and those with lesser ability. There thinking was correct that a different pedagogy was required for the weaker students, even though they were not aware of the word. This was for that time a truly modern concept. The concept was later developed by Gardner in the1990's, whose work was based on 'multiple intelligences.' His basic premise was that different people think differently and understand differently.

Conversely, our education system is designed to teach everyone in the same manner – one size fits all. The real need is create technology based pedagogies, with customized content, to cater to each learning style and ability. The task is not as complex as it seems. Currently, about ten or so different intelligences have been identified. With the support of technology the appropriate tools can be designed to cater to these.





Let the students feel that they are being discriminated against or allow them to feel a sense of inferiority. An experience I underwent when I was classified as a weak student. We have to remember that no one particular learning style or intelligence is superior to another – it is just that we all learn differently. A fact that is reflected through the other extreme end of technology: using interactive games to teach. The most popular games are those that allow you to win occasionally but also incorporate the element of loss. Games which only allow you to win or lose, do not work. Similarly, it is the job of a teacher, pedagogy and technology to create learning methodologies which teach and do not discriminate. If a student answers wrongly, the objective should be to understand why that is so. What is his learning style and how can we teach.

Anyway back to my story, where my school tried this modern innovation. The result was that I topped the lesser student group. Another modern incentive which our school provided was that the sections were named after the top position holders – the intelligent group. This created strong extrinsic motivation for students to perform well.

Metropolitan Area Network (MAN)

- MAN is an extension of LANs.
- It normally covers the area of a city (are less than 100KMs.

- Uses a combination of different hardware and transmission media to cover distances efficiently.

Wide Area Network and its Characteristics

It is defined as networking in a large geographical area, often a country or continent.

Characteristics of WAN

- WAN uses telephone lines or satellite links as a medium.
- LAN may be connected to WAN.
- It covers different cities or countries.
- WANs are not owned by anyone organization but are under collective ownership and management.
- Complex network design
- Error rate is large.
- Speed is less compared to LAN

Advantages of ICT in Education

- Quick access to information
- Easy availability of updated data
- Connecting Geographically dispersed regions
- Catering to the Individual differences
- Wider range of communication media
- Wider learning opportunities for pupils

Topic 6 Classroom Technology

Now my story turns towards high school. In the seventh standard I used to study Arabic and was taught by my Aunt. By that time I had also mastered mathematics. But before we proceed I would like to turn back to my primary school and discuss a topic which is strongly related to technology. In those days we used to use a tablet. This was used for developing penmanship. Great fanfare, which was quite exciting, went into preparing the appropriate tablet, washing it and using clay to coat the surface. A reed pen was sharpened for use. This was the technology of our times. It was a fun technology and environmentally friendly, no wastage took place apart from the ink, very unlike today. Anyway, the current counterpart to our technology is the modern tablet (apple's IPad or android).

We can also be used on writing and for penmanship. It is an intelligent tablet; if you deviate from the prescribed penmanship format the tablet lets you know. In our times we were taught by teachers who by told us how to hold the reed pen and then by holding our hands guided how we wrote. A latter innovation used writing books where the appropriate letters were printed in a broken (dashed) form and we had to complete the letters. Our tablets were based on static technology. It did not provide instant feedback; it was the job of the teacher. Tablets these days can be designed to teach you this art and also provide instant feedback, if you start to make a mistake - a quicker way to learn. These tablets can also be used for storing all your textbooks. In comparison to actual text books which not only cost enormously, waste environmental resources and need to be lugged around. Today's technology allows you to create a tablet which not only allows you to do your work but contain all your learning resources.

Internet

Internet is a huge collection of computer networks that can be communicated with each other. This word is coined from the words 'interconnection' and 'network'. Through this, each computer user can communicate and share common resources with other users.

Web Server

It is a programme and a computer clubbed into one entity which responds to the requests from web browsers for internet resources. The primary function of a web server is to deliver web pages to clients' e. g. Apache HTTP Server, Microsoft Internet Information Services (IIS), Sun Java System Web Server.

Topic 7 What we are taught?

From the last example we can clearly see the need for alternate methods of teaching. Yet, unfortunately for the greater part we are still utilizing the methodology employed in the past. What we need instead is to understand our objectives clearly. Should the focus be on form or should we make students learn real problem solving skill and critical thinking skills. Here I do not refer to college or high school level but primary school. What are more important, dictation skills or thinking capabilities? A fourth, fifth grade student is very creative and has his opinions. Unfortunately, our educational system gradually diminishes, if not outright eliminates, this natural enquiry ability. Now in terms of technology it is up to us how we utilize it. If we only use tablets as was done for the older tablets, we would be misusing and wasting technology. In Horten's, E-learning by Design, he states that three elements are required for teaching; memorization, do and connect activities. All three elements need to be present when considering appropriate design of technological pedagogy.

Web Browser

It is a programme that allows a user to display and interact with a 'hypertext' documents

e. g. Internet Explorer, Net Scape Navigator, Mozilla Firefox, Google Chrome.

Difference between Website and Web Page

Website

Website is defined as a collection of related pages on particular information.

Web Page

It is a file of information stored on a web server.

Topic 8 Proving Theorems

Moving onto the night standard and geometry; in our days we had theorems in geometry, which we needed to prove. It is unfortunate that these days we have none, since these encouraged a certain way of thinking and required creativity. Again, we had quizzes every day to monitor our performance. Unlike earlier classes, the class sizes were very large in our High School. Each class had close to a hundred children, there were four sections and one or two teachers were available to teach the entire batch. As mentioned earlier the quizzes were done on a daily basis. It was necessary that they were marked on a daily basis and handed in the next day. A task that was physically impossible for the teachers. With the current technology available this would not be an issue. An innovative solution was developed in the form of Teaching Assistants in those times. Later when I was teaching at various universities I truly discovered the utility of teaching assistants. It was the job of the teaching assistant to grade the quizzes and address any particular problems the students faced. Now a computer program can help you as a teaching assistant in marking quizzes instantly and efficiently?

Here I would like to point out that; pedagogy the science of learning states that there is a tremendous difference between a student and a teacher in terms of understanding. A teacher can take a lot of things as given which is not applicable for the student. The mental learning process entailing; memorization, doing and connecting may vary considerably from what the teacher is trying to put across. Instead if a student was to teach the same thing it might imply a similar thinking process and perhaps better understanding from a student perspective. By the time I was in high school I had started to excel in academics and usually topped my class. It was because of this that I was chosen as a class monitor and teaching

assistant. Apart from my other duties, it was also my responsibility to check all the quizzes and hand them back the next day. My own quizzes were checked by the teacher himself, which was quite equitable and ensured transparency. It is important to remember that without the help of technology, in those days, we could still provide instant feedback to the student, which greatly assisted in the learning process.

Homepage

Home page is the first hypertext document to be shown when a user follows a link to the web server.

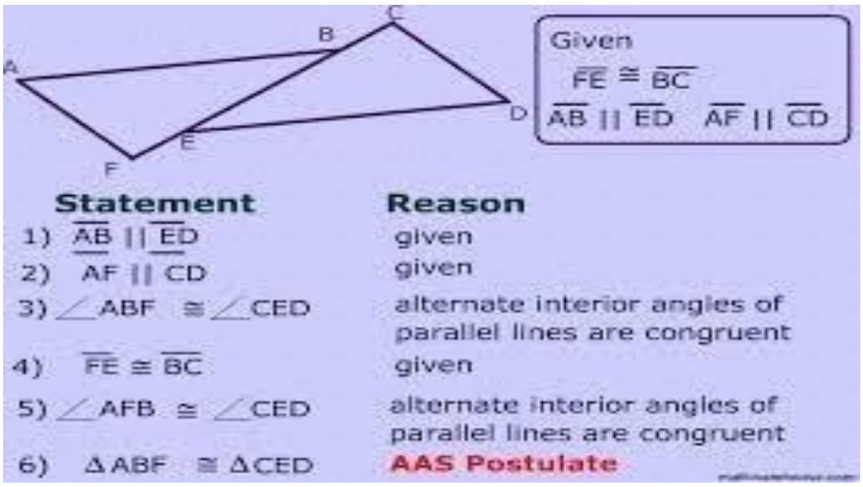
Search Engines

Search engines can be defined as special tool to search for information on the net.

- AltaVista
- Yahoo
- Google
- Bing
- AOL

Topic 9 Test Challenge

The next story is about how I was, one day, challenged by a student that my grading was incorrect. The student sat next to me class in the ninth standard and had previously come second in the entire Punjab Board. He was main competition. While he was brilliant but a little lax about his studies, I made up with hard work and effort and was able to usually beat him. Now how do you deal with students who are extremely intelligent but less focused? How do you motivate them and keep their interested? This is truly critical since these people are integral to development of society. They are usually difficult and do not fit in the typical mold, but are creative and bring about major innovations. These are the people who change the game.



Now Ali, my competition was one such student. On a particular quiz day he came to class without studying; while I on the other hand, had put in great effort and knew the theorem and its proof by heart. While actually doing the quiz it seemed to me that the book was open in front of me. Here it needs to be understood that it is critical, from a perspective of pedagogy and teaching, to be able to distinguish between true understanding and mere memorization. More importantly how this difference should be assessed? Here technology can play a vital role? Back to the story, while I solved the theorem line by line as given in the book, he tried to solve it on his own. This was truly remarkable and impacted me greatly. Whenever I am teaching if a student commits an intelligent mistake I give him more marks than a student who just reproduces whatever is given in the text book. Anyway, at that time, while checking his quiz, I gave him a zero, since instead of proving the theorem he actually disproved it. The mistake was very subtle and one which I could not identify at that time.

For my quiz the teacher gave me full marks. Next day when the teacher came to class and all the quizzes were distributed the teacher showed my quiz to the class and said that I had gotten full marks. Accountability in those days was crucial and students were shown that their papers were marked correctly.

World Wide Web (WWW)

- WWW is a vast collection of documents stored on internet computers.
- It was invented by Tim Berner Lee.
- It provides easy access to information.
- It is a system of media rich documents spread across the internet, linked with each other.
- WWW documents contain texts, pictures, sound, video, etc.

Intranet and its Characteristics

Intranet can be defined as collection of private computer networks within an organization.

- Internal or private network of an organization based on internet technology (such as hypertext and protocols) and accessed over the internet.
- An intranet is meant for the exclusive use of the organization and its associates (customers, employees, members, suppliers, etc.) and is protected from unauthorized access with security systems such as firewalls.
- An intranet should be closed off to the general public and require a login for authorized users.

Topic 10 Memorization VS Understanding

Ali stood up in the class and told the teacher that it is not fair that I was given full marks while he was given a zero. He said all I had done was to reproduce exactly what was in the textbook. While I tried to use my intelligence to solve the problem, even if it was disproved

It was not fair. The teacher looked at me and I told him that instead of proving the theorem he has disproven it. The solution proposed by the teacher was that I should sit with him, go through it line by line and sort out where Ali went wrong. This would also show if I had only memorized the theorem or also understood it. As mentioned earlier it is critical for a pedagogist to understand this difference and surprisingly the teachers in those day did, which was a very modern concept. When I actually sat with him and went through his quiz in detail I had a very surprising feeling.

From a view of pedagogy and technology it is critical that we understand this difference. When I go through a textbook I presume that what is given is correct. But this only engages my memorization faculty and to some extent understanding. While going through his quiz my faculty of doing and connecting were also engaged and it was a very unique learning experience and an enlightening one. It was through this exercise that I really understood the theorem and its proof. Finally, we were able to locate his mistake and we went back to teacher and told him this is where he went wrong and he realizes his mistake. I told the teacher even though wrong it was a very intelligent mistake. On hearing this, the teachers asked me what should be his actual marks. I told him he should decide. If I remember correctly he was given half the marks or slightly more. The teacher also asked him to study a bit more in the future. God has given you a good brain please, use it slightly more! The important lesson is that, while memorization is an essential part of learning, the doing and connecting elements are more critical. This is how the story of my school unfolds.

Difference between Uploads and Downloads

Both upload and download refer to the process of transferring a file.

Uploading

- Upload means to transfer a file or files from your own computer to another computer.
- Uploading is the process of copying files from your computer to a remote location. For example, you might transfer a file from your home PC to the Yahoo! computer that stores your Web Hosting files.

Downloading

- Download means to transfer a file from another computer to your own computer.
- Downloading is the process of copying files to your computer from a remote location. For example, you might download a file from your Web Hosting account to your home PC.

Hosting

- For a website to be viewed by other people it must be stored on a computer (server) that is connected to the internet.
- A company that provides this service is known as a host; and the service it provides is hosting.

Uses of Computer Networks

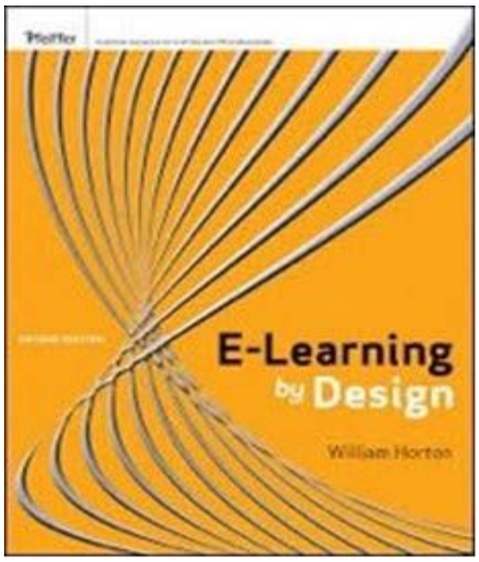
- For sharing resources
- For high reliability
- For saving money
- For using as communication medium
- For accessing remote information
- For person to person communication
- For interactive entertainment

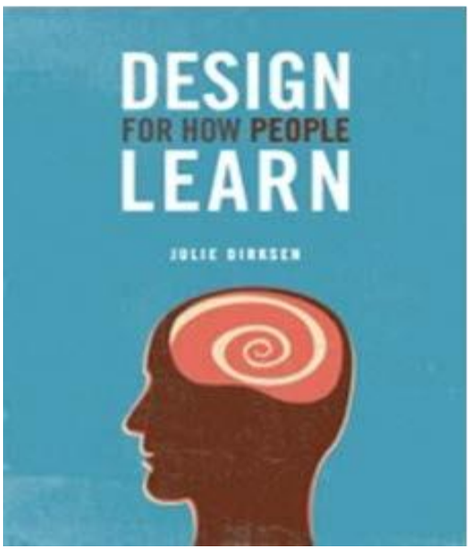
Chapter 2 Connecting New Knowledge with Prior Knowledge

Topic 11 Objectives, Content and Deliverables

Previously, we had discussed stories, particularly that of my education. The purpose was to provide an overview of what we are attempting in this course. If we had discussed these issues in isolation, purely definitions, they would not provide you with a particular context. By association with my educational experiences and perhaps with your own, it may provide a better understanding.

We now turn to what are the courses objectives, content and deliverables. Here, we will also discuss the expertise that you would acquire from this course.





We begin by a quotation from a famous pedagogist/psychologist in education: “The single most important factor in influencing learning is prior knowledge and then the next step is relating the prior knowledge to the new knowledge.” This in our case implies that when coming across new information, observing, listening, or in case of a book reading and

understanding alone are not sufficient. True learning will only arise when you can link this new information which is being processed through your brain, perhaps in form of questions or new concepts, when you can relate them to your prior experience. In terms of cognitive setup your brain is designed to learn and retain when particular information is grounded in your personal experience. This was discussed earlier in terms of William Horton's book E Learning by Design (***Absorb – Do – Connect***). This may seem like hard going but we will try to simplify and illustrate this through the use of another story. Before proceeding, a small side note: we will be referring to quite a few books, which utilize different terminologies. We should not be worried by this fact since they are referring to the same things. Our focus will be on what they are trying to say and we will try to minimize the definitions as far as possible.

Web Resources

Web resources are defined as web pages and documents on the Internet that provide useful information.

Bookmarks

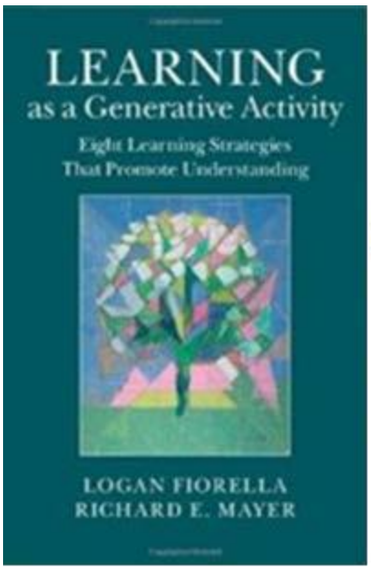
- Book marks can be defined as, a collection of direct links to predefined web pages which are stored in your web browser.
- Bookmarks can be created and managed by the user themselves. Most browsers come packaged with several existing bookmarks.

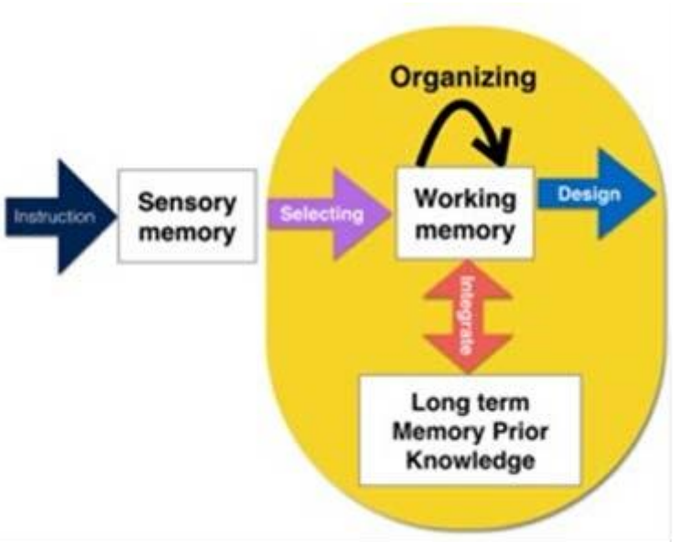
Topic 12 Learning as a Generative Activity

Another interesting book, Design for How People Learn by Julie Derkson, is a fun learning tool which is full of cartoons and illustration, which allows you to learn about Learning, Pedagogy and Technology required. A colorful book which is also available in an e-format deals with the question of learning in this form. The process of connecting with prior knowledge (Absorb – Do – Connect) is described a cognitive process which create friction in your mind due to the new data. The key is to transpose this data on prior concepts available to you or rather create linkage between the two. For example an old relative visits for the first time. The first order of things is to establish the exact relationship without which you are not quite comfortable and there is friction in your mind. Once the relationship is established your feel more comfortable, since you now know how the person fits into the scheme of things (family tree) and you can proceed further. The same process happens with any new information (word, picture, concept) there is friction in your mind until that thing is placed within the cognitive schematics of your brain. Friction or active involvement is crucial. In context of learning process the active involvement can be in the form of curiosity, disappointment, initial failure which ultimately lead to that aha moment, when true learning transpires. Once the puzzle pieces fall into place the concept is clearly understood and retained. We continually reiterate on this theme since this is key consideration when designing any learning technology.

A third book which we need to consider here is; Learning as a Generative Activity – Eight learning strategies that promote understanding by Richard Meyer and??? This is a very recent book, published in 2015 and one we believe will be valuable and informative addition to this course. The book deals with the same things which we covered earlier from previously mentioned books. In this book the learning process is referred to as a Generative Activity. By this the author implies that people wishing to learn with understanding should engage in appropriate Cognitive Processing. This process simply is as follows: selecting key information, mentally organizing it, and integration with relevant prior knowledge. This explanation differs in two ways from the earlier definitions. The process is selecting information refers to the particular information which we are trying to absorb, since it would be impossible to absorb everything, i.e.
there is a filter mechanism to the input process, whether perceptual or sensory. Additionally, integration is with relevant prior knowledge; it has to be contextual to make sense. All three books, which we will use throughout the course, will allow us to breakdown the learning process into smaller segments for greater understanding and analysis. This will allow the

appropriate use of pedagogy and technology in understanding an intelligent and relevant learning process.





Hypertext

- Hypertext is generally the text displayed on a computer display or other electronic device.

- It may have links to other text which the reader can immediately access.
- The hypertext pages are interconnected by hyperlinks, typically activated by a mouse click, key press or by touching the screen.
- Hypertext is sometimes used to describe tables, images and other with hyperlinks.

- Hypertext is the underlying concept defining the structure of the World Wide Web with pages often written in the HTML.
- It enables an easy to use and flexible connection and sharing of information over the Internet.

Markup Language

- Markup language is a modern system for annotating a document in a way that is distinguishable from the text.
- The idea and terminology evolved from the "marking up" of paper manuscripts.

    - A widely used markup language is Hyper Text Markup Language (HTML), one of the document formats of the World Wide Web.

Topic 13 Social, Teaching and Cognitive Presence

We now go back to Muslim High School and I am still studying in primary school. As I told you earlier, students at that time were segregated in different sections based on ability. Those having difficulties with learning were placed in a different section from those who had no issues. I had problems with quite a few subjects and was in the lesser group. A situation, which was very disturbing, for my mother, who was a Philosophy Professor. In those days there was no distinction between Psychology and Philosophy which were treated as one subject. The conjoined subject fell under the purview of arts, unlike today where Psychology is a separate science. My mother understood that I was having problem not because of my lack of intelligence but due to my social integration which is needed for social presence in the class room (apart from this presence - we need teaching presence and cognitive presence for meaningful learning to take place - we shall talk about these presences in detail later). I was an only child and singularly brought up by my mother. She told me to start socially interacting with other children in my class and that I could invite my friends over to the house and that she could help me and friends with their homework. Now what was the logic behind her offer? In her wisdom she realized when studying in a group, it would be the

right atmosphere and she could be strict on the other student which would also keep me in line. Another thing which she did, and for which I remain grateful, was that she made an effort to ensure that I complete my homework earlier with her assistance and then help other complete theirs. She never told me why she was doing this. Now going through these books, especially Generative Learning, I observe that one of the learning strategies out of eight is **-** learning by teaching. It has proven experimentally that by teaching peers you learn rapidly. For her time it was truly incisive. Another reason she wanted us to study together was that it would be simpler to discuss ideas and ask each other for help, if unable to understand something in class. Again she was way ahead of her time. These days the phenomena these days is referred to as Social Presence. This refers to the fact that any student either in class or groups, physically or on-line or need to have awareness that they are connected and not alone. It is critical in the sense of social presence that each student has an equitable access to voice their opinions; they can express themselves and approach someone for their problems and queries.

When she initially told me to bring them over, I told her I would be hungry. She told me it was not a problem and they too can have lunch. Our school was located between the cantonment and old city. In those days there were only two classes in Multan, the landed and mostly lower middle to lower classes. The very well off were not really inclined towards education. Similarly, the poor did not really realize the real utility of education and were mostly accidental students. The first time my friends came over to our place they felt terribly out of place.

Learning Aids

Learning aids can be defined as any device/Aids which help self-learning/group learning.

Teaching Aids

- Teaching aids are the physical tools used to convey information in the classroom.
- Teaching Aids are any device which can be used to make the communication more effective.
- Teaching Aids are any device which can be used to make the learning experience more concrete, more realistic and more dynamic.
- 50 % of what we HEAR and SEE
- 70 % of what we SAY
- 90 % of what we SAY and DO

Topic 14 My House and Associations

Before turning to this story let me briefly describe my house. It was located next to small canal in Pul Moaj Darya. The canal no longer exists. The house itself was a huge pre-partition mansion belonging to a Hindu lawyer. We were allocated half of the mansion. It was surrounded by fields and trees and was isolated from the city. There was no boundary wall except a fence of cane? There was little movement around and when my friends were invited they told me that was a strange house. When they came over, crossing the canal and seeing the huge house, with its looming corridors they were quite bewildered. They were equally curious and were trying to take in their surroundings. The first thing they saw was a wooden shelf full of books and magazine. This was ignored. Instead there was a lot of female laundry which was hung out to dry and this was observed; reinforcing their belief that there was no male presence in the house. Next they turned towards my grandmother who was sitting in the porch on a divan against a bolster and greeted her. As she left for the house to inform someone to get drinks for them, they noticed she was wearing a loose pajama. Now in Multan, in those days this was not normally worn and one could only see this in the movies. Now all this was being selected by friends for interpretation. One of these friends was from the inner city from dubious area. Naturally, he was trying to absorb this information and relate this to his prior knowledge.

Psychology of Teaching Aids

Research done by COBUN (1968) indicates that generally we LEARN:

- 1 % through TASTE
- 1.5 % through TOUCH
- 3.5 % through SMELL
- 11 % through HEARING
- 83 % through SIGHT

Research done by COBUN (1968) indicates that generally we remember:

- 10 % of what we READ
- 20 % of what we HEAR
- 30 % of what we SEE

Advantages of Teaching Aids

- Help to learn more and remember for long.
- Motivate the learner.
- Give clarity to learning.
- Give reality and vividness to learning situations.
- Make abstract concrete
- Reduce verbalism.
- Provide variety in methods of teaching and learning.
- Make learning interesting meaningful and permanent.
- Develop deeper understanding.
- Arouse curiosity and self-activity.
- Saving of energy and time
- Spread of education on a mass scale.

Topic 15 Mental Pictures

The mental picture he created was truly astounding. Since he could not ask me directly, he was rather embarrassed; he instead asked me indirect questions. Asking relevant questions is also an important part of learning and is an art. It is also an important pedagogical learning strategy. The question he asked me was truly relevant and I remember it to this day. He was amazingly brilliant and it is sad that we cannot provide the appropriate educational opportunities to such brilliant students. The question he asked me was that, is there pandan in your house? On the surface this seems as rather silly question. Yet, his mental picture was hinged on this question. I told him yes but was used occasionally. His picture was now complete. His next question was that is there a musical instrument in the house. When I replied no, my mother and aunts were teachers and there was never a musical instrument in our house. The entire picture created by him fell apart; I could see the disappointment in his face. I believe this example illustrates the learning process and how an individual tires to solve a particular problem. The same process which a doctor, detective and physicist employ. Some observations, few clues, and some information which needs to be connected to form a hypothesis and a theory arrived at. Another important point to remember is that none of the other friends were following his logic and were as perplexed as I was. Based on his prior experience only he could link this new information in a certain light and create his particular mental picture.

The story does not end here. Since the first premise had failed my friend was still trying to place the house in a context which was relevant to his own experience. We moved to the main room, which was stacked with numerous books, few desks and beds. This was the area where my mother and aunts studied and slept. Incidentally, I remember my aunt listening to the BBC on the radio about American bombing in Vietnam. The terrible memories of carpet bombing and other atrocities remain vividly with me, to this day.

Anyway, on seeing all the books and desks my friend enquired if this was a library? He was still trying to categorize the house and contextually integrate it to his previous knowledge.

The basic purpose of the story was to illustrate how we learn. To arrive at understanding we have to transverse through a defined process. With advances in pedagogy and science of learning we are in a position to chart this process in its smaller constituent components. This helps us in diagnosing or mapping the process where an individual might falter. It is no longer sufficient to say that a student is not able to grasp a particular concept. We are now in a position to exactly pinpoint the area where he is facing a problem. Is the student facing problems in the absorbing or selection of knowledge, is it the DO part and finally is having problem connecting?
Are his past experiences and references valid for successful integration of new knowledge?

Characteristics of Good Teaching Aids

- They should be meaningful and purposeful
- They should be accurate in every respect
- They should be simple
- They should be cheap
- As far as possible, they should be improvised.
- They should be large enough to be properly seen by the students for whom they are meant.
- They should be up to date
- They should be easily portable
- They should be according to the mental level of the student.
- They should be motivating the learner.

Programmed Learning

- Programmed learning is a self-instructional and self-corrective technique in which all the learning material is presented to the learner stage by stage through sequentially arranged smaller units called frames. The frames are graded according to the level of difficulty as well as logical sequence.
- Programmed Learning is a carefully specified, systematically planned, empirically established, skillfully arranged and effectively controlled self-instructional technique for providing individualized instruction or learning experience to the learner.
- Programmed learning is available in the form of books, cards, machine, linear programming, branched programming etc.

Hyper Text Markup Language (HTM)

Hyper Text Markup Language (HTML) is a standard language used for developing web pages'. Hyper Text Markup Language is a markup language that web browsers use to interpret and compose text, images and other material into visual web pages.

History of HTML

- In 1980, a markup language, i.e., Standard Generalized Markup Language or SGML was developed.
- HTML was evolved from SGML.

- Presently, HTML is advanced to DHTML and then to XML (Extensible Markup Language) and now to VRML (Virtual Reality Modeling Language).

HTML Coding

- HTML codes are known as 'HTML Tags'.
- An HTML document has two parts, Markup Language Tags and Web page content Text Information.

Points to Remember While Writing HTML Document

- Each tag is enclosed within a '<' (left bracket) and '>' (right bracket). This differentiates them from text.
- An opened tag must be closed

- Opening tag is denoted by < >
- Closing tag is denoted by </ >
- Generally the HTML tags are written in upper case
- It is not a case sensitive language.
- Coding can be done in any text Editor (Windows notepad, Ubuntu –G-Edit).
- When we save HTML file, we should add .html or .HTM after the file name.

Topic 16 Diagnosing and Mapping the Process

Suppose a student is facing difficulty in grasping the Periodic Table in Chemistry. Previously, when help was asked for all we would do is repeat what we had already taught or possibly alter it slightly. This is no longer valid; we are now in a position, through technology, to provide help in determining the particular student probably knows this or that. In most cases this proved to be false and caused great distress to student in the learning process. We can now successfully identify where corrective action is required.

If you remember another past story, a really intelligent class fellow had disproved a geometry theorem instead of proving it? We could also utilize technology in this case to see where he went wrong? Was it an issue with absorption, doing or connecting the knowledge?

Despite our sincere efforts at sidelining a lot of definition we still require some working knowledge, especially in context of the books we would be utilizing.

Teaching as a Noble Profession

- Teaching is regarded as the noblest of all professions in the world.
- A good teacher not only shows the right path that the students should follow but also prepares the human resource for the further development of the nation.
- Teaching has the power to create a healthy and peaceful world.
- It has the capacity to inspire lifelong learning and a passion for knowledge, understanding, and innovation.

Teaching

- “Teaching is an intimate contact between a more mature personality and less mature one which is designed to further the education of the latter.”
- The aim of teaching is to transform a total man and his personality

Training

- In training the various kinds of skill are taught.
- Training has specific goals of improving one's capacity, and performance.
- The trainees are taught to perform skills which they attain during training and practice.
- There is mental and physical activity in training, but more and more of the activity is physical.

Instruction

- Instruction is at the higher level of training.
- Instructions tell people how to perform a process.
- In instruction there is better level of the use of intellectual powers of the trainee.
- The aim of teaching is to transform a total man and his personality, but the aim of instruction is to develop the intellectual powers in a given direction.

Topic 17 Selecting, Organizing and Integrating

Apart from the learning process; selecting of information, organization of information and its integration we also need to understand the monitoring and controlling of these cognitive processes. This is especially critical in the context of students being able to do it on their own during a complex understanding task. The ability to do this is known as meta-learning and is much in vogue these days: the ability of students to learn and control their own learning process. Naturally, this has much wider application since learning and de-learning is a continuous process and not confined solely to acquiring education. Coupled with the enormous amount of information which we are bombarded these days, we will all have to learn to select, organize, connect and integrate information at a rapid pace.

A person may be able to select appropriate information, organize it and integrate it yet they still may not learn – the person just does not want to learn. We can say that this particular person does not seem motivated. What is then the technical definition of motivation for our purposes? “Motivation is defined as a special cognitive state that starts, energizes and maintains a specific goal directed behavior.” Now when does this state occur? There are two ways through which this occurs: extrinsic mechanism, where reward and punishment determine a person’s level of motivation; and an intrinsic mechanism where the individual is self-motivated.

Even though the carrot and stick approach is a time honored and recognized methodology for motivation; yet if we look at history for the past fifty years we see that all major innovations and inventions which have redefined the way we live, we see that there was no coercive element behind the individuals and firms, who brought them to us. These people or groups of people were intrinsically motivated. For firms like Apple profit was not the sole objective.

When I was at LUMS our department (of Computer Science) used to stay in office till ten at night. We aimed to create a Doctorate program which would not only be compatible globally but would exceed most. We were offered no rewards. When an artist is creating his work, he is lost in it. The process of creation is reward enough – passion paves the way.

Computer Assisted Instruction (CAI)

- A self-learning technique, usually offline/online, involving interaction of the student with programmed instructional materials.
- “It is the use of computer to assist in the presentation of instructional material to a student to monitor learning process or to select additional instructional material in accordance with the needs of individual learners”
- CAI facilitates instant access to accurate information with infinite opportunity for practice. It also provides opportunity for systematically organized learning, to the maximum level possible, for all learners. It makes learning easy and interesting.
- Computer Assisted Instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material.
- CAI uses a combination of text, graphics, sound and video in enhancing the learning process.

Teaching Machines

- These were developed by S.L. Pressy.
- It’s a piece of device designed to be operated by an individual student for self-learning.
- The student is presented with a question by some form of display on the machine.
- The student is required to respond either to write answer or put a button to indicate the correct response.
- The student will inform the correctness of the answer.
- An account is kept of the responses made by the student.

Topic 18 Intrinsic Motivation

Now let us turn to a story of intrinsic motivation. Ten years ago, while I was a professor at LUMS, we went to my mother's house to meet with her. At that time I usually drove my own car. Being in a hurry I parked my car in a manner which was inconvenient for other drivers. I realized my mistake but did not rectify it. After having visited my mother and walking back to the car with her and my wife; while my mother was talking to my wife I thought I would go move the car. As I approached the car I saw another car trying to pass and it seems to be having difficulty doing so. The other cars window rolled down and an extremely beautiful lady smiled and told me there was no need to move my car. I truly felt embarrassed but unfortunately my wife, at a little distance, also saw the smile and saw that she was saying something to me.

Naturally, my wife was rather miffed and asked me why that lady was being so bold with me? Even though there was no truth to the picture my wife was painting in her head. She only chose to see the beautiful lady smiling at me. She did not see the parked car which was obstructing her way – selecting the wrong information.

Information and Communication Technology (ICT)

This concept involves transfer and use of all kinds of information. ICT is the foundation of economy and a driving force of social changes in the 21st century. Distance is no longer an issue when it comes to accessing information; for example, working-from-home, distance learning, e-banking, and e-government are now possible from any place with an Internet connection and a computing device.

Information Technology

IT (Information Technology) encompasses all of the technology that we use to collect, process, protect and store information. It refers to hardware, software (computer programs), and computer networks.

Topic 19 Car Trouble

My mother asked me what was going on: I told her about the parked car but my wife told me to tell her the real reason. Then she asked my mother where this lady lived. My mother told her she had not seen the car before. You could tell by her (my wife) expression the turmoil that was taking place in her mind. She was intrinsically motivated to find out about the lady. Fearing future repercussion I told her that we should leave. As we sat in the car and closing my door, to distract her, I told her that there seems to be some problem with door closing. She turned towards me smiling and said she had figured out why the lady was smiling at me? She asked me to step down, which I did immediately. Next she told me to see the blue paint on our car. Despite the fact that she was strongly, extrinsically motivated by jealousy, she was able to figure out what had actually transpired. The lady had hit our car, as reflected by the problematic door and residual paint from her car. The smile I figured out was to distract me from seeing what had actually occurred.

My wife figured this out quite easily, which another person could not, because of some prior knowledge – my parking was causing difficulty for other cars and her intrinsic motivation through jealousy to disprove the fact that another young and attractive lady was drawn to me.

This story clearly reflects the importance of accidental prior knowledge and intrinsic motivation.

Hardware

The concept of hardware includes computer components, the physical and tangible parts of the computer, i.e., electrical, electronic and mechanical parts which comprise a computer.

Working Principle of a Computer

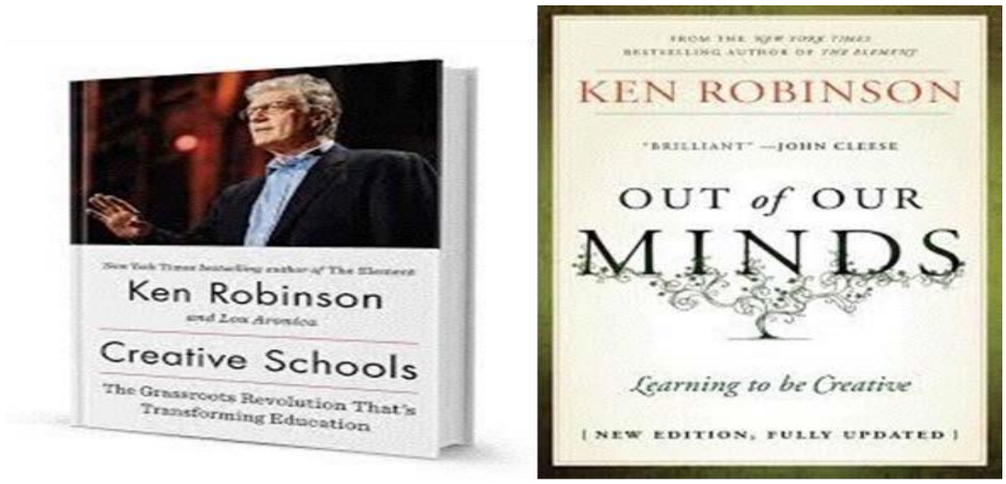
Computer working principle: data are entered into a computer via input devices, then are processed and stored in a system unit, and are finally displayed by the output device.

Chapter 3 One Size Fits All

Topic 20 Rapidly Changing Technologies

Education is a vast field in which technology can be utilized in innumerable ways. The tremendous amount of changes in technology, in the past decade, has been astounding. If we go back twenty years it is even more amazing. For instance; when we used to go to university, we did not even possess a calculator. Our technology consisted of a slide rule.

Just in my lifetime the advances in technology have been mind boggling. Unfortunately, despite these changes none have been utilized in education – an area where it can assist greatly.



We all have to now face the existing situation and see where technology can play a role in overcoming the existing deficiencies in the education system. Turning to Ken Robinson's book, 'Out of our Minds, we begin with this quotation: "current systems of education were not designed to meet the challenges we now face; they were developed to meet the needs of a former age. Reform is not enough they need to be transformed." The reference from the quote about educational system design, i.e. what were they were designed for will constitute an interesting separate module. To transform any system we have the following option: by delving into the system and attempting to correct its inherent issues, which in our case consists of teachers training, student involvement, change in pedagogy, assessment and so on. Yet we have to understand that certain systems are quite static and do not retain the capacity to be flexible.
These can only be transformed radically, through the use of appropriate technology.

Sadly this is the case with the current educational system, which is cannot be rectified by cosmetic and patchwork measures. A major overhaul is required and the current state of technology allows us to do this in a much more efficient, less time intensive and cheaper manner more importantly in a more exciting way.

Personal Computer

Personal computer (PC), as the name suggests, is intended for personal use, as opposed to the server, which is used by a larger number of people simultaneously, from different locations, often via terminals. If you do not intend to move your computer frequently

from one place to another, and at the same time you want maximal price/performance ratio, then you should use a desktop computer. In comparison to laptops or tablet computers, it is much larger in size, inconvenient to carry/move, consumes more electricity but has a much better price/performance ratio. Also, they are much easier to upgrade.

Desktop Computers and Laptop or Tablet PC

- Laptop or tablet PC is used by individuals who have the need to travel with a computer or simply use them for aesthetic reasons when computing power is not an issue. Laptop computers, as opposed to tablet PCs, more closely resemble a personal computer when it comes to data input. Data entry is done via keyboard and mouse, while the tablet PC data entry is done via touch screen.
- Unlike desktop computers, notebooks and tablet PCs are optimized for portability, low power requirements at the expense of performance and can be used (for a limited period of time-i.e. until the batteries are depleted) without connection to the power grid. In order to prepare a laptop or a tablet computer for use without a power connection, it is necessary to recharge the batteries.

Meaning of Teaching

- Teaching is to cause the child to learn and acquire the desired knowledge, skills and also desired ways of living in the society.
- Teaching is the stimulation, guidance, direction and encouragement of learning.
- Teaching is the communication between two or more persons, who influence each other by their ideas and learn something in the process of interaction.
- Teaching is to fill the minds of the learner by information and knowledge of facts for future use.
- Teaching is the process in which learner, teacher and other variables are organized in a systematic way to attain some predetermined goals.

Definitions of Teaching

- “Teaching is an intimate contact between a more mature personality and less mature one which is designed to further the education of the latter.” H.C.Morrison (1934)
- "Teaching means many different things, that teaching act varies from person to person and from situation to situation." (Bar, 1961)
- The behavior or activities of persons as they go about doing whatever is required of teachers, particularly those activities which are concerned with the guidance or direction of learning of others." (Ryan, 1965)
- Teaching is the arrangement of contingencies of reinforcement under which students learn. They learn without teaching in their natural environment, but teachers arrange special contingencies which expedite learning and hastening the appearance of behavior which would otherwise be acquired slowly or making scene of the appearance of behavior which might otherwise never occur." (B.F. Skinner. 1968)
- "Teaching is an act of interpersonal influence aimed at changing the ways in which other persons can or will behave." (N.L. Gage, 1963)

Functions of Teaching

Preservative Function of Teaching

- The main function of TEACHING is to preserve and protect the old values, customs, beliefs, traditions, etc.
- Teaching must help in preserving the vital elements of our heritage.

Transmitive Function of Teaching

- Teaching transfers knowledge, ideologies, theories, principles and attributes from one generation to another. Thus, it contributes greatly to the general progress of society.

Progressive Function of Teaching

- Teaching provides opportunities to recognize and restructure human experiences and as a result of this, there is development of human civilization and culture.

Topic 21 A Model School

We, now, went back to our stories and the Muslim High School, Multan. Here we are talking about the sixties and despite the fact that this school was located in the small town, then, of Multan, yet the school was academically outstanding- not only in Pakistan but I would say Asia. It was run by a visionary headmaster, Chaudhry Abdul Rehman, with the help of a small management committee. He was stickler for all things educational and could not bear to compromise on quality. Despite the fact that the school was a model one, there were shortcomings. These in this day and age with help of technology can be addressed.

In those days one of the major criteria which academically distinguished a particular school was the number of scholarships for matriculation which were granted, by the Punjab Board. There were numerous schools which excelled academically, including Central Model School in Lahore; closer to home was the Millat School in Multan. But thanks to our principal our school was also renowned for its extracurricular activities including its sports programs. This was renowned not only locally, but at the national level. A lot of our students were qualified to take part in any national team in their particular sport. An interesting sidelight, a lot of these students who excelled at sports lacked in their academics - a critical question, not only in our context but globally, and one which we will come back to later. Apart from sports, at our school, there were literary and debating teams, again competing at the national level. Drama and theatre was encouraged, with the teachers acting as amateur Directors. The theatrical presentations were open to students from other institutions, along with the general public. Music was another area which was emphasized. Our school band was considered the second best band after the army's in the entire country. There were literary gathering every week, organized by the students themselves. Cold water was available in all classrooms during summer. The procurement of ice, its management and distribution was the responsibility of the students and constituted their social participation.

PDA (Personal Digital Assistant) PALM

PDA Personal Digital Assistant (PALM) is a convenient small sized computer. It easily connects to mobile phones and can prove a good solution for less demanding users. As the name suggests, it is a device that fits in the user's palm. Its name directly tells us that this computer is more of an assistant and not a workstation-whose name suggests the superiority in capabilities and computing power, especially in comparison with PDA.

Mobile Phones and Smart Phones

- Mobile phone is a portable electronic device used for distant communication. In recent years, mobile phone has evolved from simple communication device into a multifunctional device. Additional functions, such as short text messaging (SMS), electronic mail, Internet access, contact registration, calculator, clock, alarm, recording and photograph displaying, recording and playback of video clips, sending/ receiving multimedia messages (MMS), audio recording and playback, etc. has turned the mobile phone into an extremely useful device, whose absence would make active involvement and participation in a modern society not possible.
- Smartphone is a device that merges functionality of phones, PDAs, cameras, camcorders and computers. To function properly, Smart phones use operating systems, which are the basis for application development. Some smart phones can be connected to an external screen and keypad, which creates a working environment, similar to that of a laptop or a desktop computer. Some operating systems for Smartphone are: Google Android, Symbian, Blackberry, Palm Pilot, and Windows Phone.

Topic 22 Maintaining a Diary

Each student was required to maintain a diary and classroom cleanliness was also the responsibility of students. I will discuss these in details later. These extracurricular activities were essential to the formation of a rounded personality of student and for instilling a sense of self belief and awareness, which are critical.

Here I would like you to remember that all these activities were taking place in a school which was run on charitable donations. Most students were not paying fees and the school was entirely driven through fund raising, without any support from the government.

System Unit

The system unit (case) contains a computer's vital parts. There are two basic types of cases:

- Desktop casing is placed on a desk in a horizontal orientation.
- Towers come in 3 sizes (mini-tower, mid-tower and full-tower) and it is vertically orientated.

Mother Board and Protocol

- Motherboard, MBO is computer's basic circuit, to which all computer components are connected, directly or indirectly. Devices are connected to the motherboard through a system bus. System bus connects all devices, ensures data flow and communication between different devices using predefined protocols.
- Protocol describes a manner in which communication between devices is defined. It enables them to address each other and defines how they should look for each other on either system bus or network. Buses can, according to the purpose, be divided into:

1. Serial USB, Firmware, etc.
2. Parallel AGP, PCI, etc.
3. Mixed-Hyper Transport, Infini Band, PCI, etc.

Topic 23 Cleaning the Class

We now turn to story of school cleanliness. At the school there were only two sweepers which maintained the enormous facility. Each classroom was spotless, how was this done? Two students were assigned each day to sweep and mop the floor and ensure that it was spotless. It was the job of a committee to ensure that each classroom was immaculate and decided upon who would be awarded the prize for the cleanest classroom. One of the students, a scion of wealthy Khwaja family, whose business was in leather and his father a large and important fund donor to school, was assigned the particular task. On that particular day, after returning from assembly to the classroom we saw that the classroom was shining. Our class teacher came in and saw the classroom and was impressed by Khwaja's work. But a student stood up and complained that the work was not done by Khwaja. On enquiry Khwaja appeared to be evasive. Yet the student insisted that Khwaja had not done the work.

Another student stood up and said that he had volunteered to clean on behalf of Khwaja. It was opportune moment to actually demonstrate the principle of right and wrong and the lack of distinction between rich and poor -unlike these days where a VIP culture is rampant. The professor took him to principal, who despite the fact that his father was one of the largest donors, assigned Khwaja to clean the class next day, with the entire class not attending assembly and watching Khwaja accomplish this task -a true example of adhering to ones principles.

Cache

Cache is a small capacity memory which allows quick access to data. By storing data from working memory in cache, the speed of communication between processor and RAM

is increased. Microprocessors use three levels of fast cache, L1, L2 and L3, used to store often used data.

Central Processing Unit

Central Processing Unit (CPU or processor) is a central part of a computer (and can be referred to as the computer's "brain"). It manages all other computer parts, monitors their mutual communication and performs arithmetic-logical operations. Processor speed is measured in hertz (or megahertz or gigahertz). Most famous manufacturers for personal computer processors are Intel and AMD.

Topic 24 Inequalities in Education

As I had mentioned earlier at that time there was no middle class, per se, in Multan. The school was either attended by the very poor, whose fees were exempted, or the very rich usually sons of wealthy donors. Why did the rich, unlike today, allow their children to mingle with the lowly? The school reputation was such that most of these people choose to overlook the fact that their children would be mixing with the lower classes. For the upper classes there was no intrinsic motivation for studying, since they had their businesses setup and their landholdings. Similarly, in the lower classes the choice is between allowing children to study or engaging them in work from which a revenue stream can be established. In either case the intrinsic motivation is low.

In terms of numbers our school was operating at capacity. In the sixth standard there were six sections and the total number of students was around three hundred and sixty. The dropout rate was also rather high. Those children who were unable to keep up academically were asked to leave. That is not to say that they were not otherwise talented, some were amazingly gifted. There was student, Azeem, who was a brilliant singer; he used to perform in any all school events. If he had given further musical training along with necessary educational skills, he would have been a phenomenon. Similarly, Usman, was an amazing artist. His paintings were even commissioned by the school for an event. Despite their talents both proved to be unsuccessful in a standardized educational format and dropped out of the system – an immense shame.

Masood was a gifted actor. He starred in a drama on Tippu Sultan, which was widely acclaimed and even held a special show for the armed forces stationed in Multan Cant. Bakhtawar Shah was impromptu speaker. You could give him any subject and with minimal preparation time he would deliver an authoritative lecture. Ali Shmas ul Qamar was a poet; Mirza Ghalib could always be found in his pocket. Shahid, was a story write. Conversely, I was not a great participant in extracurricular activities. Most practice took place after school hours and I was not allowed to attend. Compared to me they were all immensely talented and if their talent was allowed to be nurtured they would prove to be the innovators and game changers, which a society desperately searches for. Their worth could not be measured in the usual criterion of success; what house they possessed, what car they drive, yet their contribution to society would have immense.

Why did they all fail? They just could not fit into the standardized educational system, while I could. I adapted to the system, called distortion and not a desirable thing. With the technology available today we would have been able to retain these stars.

Hard Disk Drive

Hard Disk Drive (HDD) is a place for permanent data storage (it does not delete/clear when computer shuts down). Its features are: large capacity, faster performance in comparison to optical devices but slower in comparison to RAM and are used for permanent data storage. We can distinguish between internal and external hard drives.

Read Only Memory (ROM) and Random Access Memory (RAM)

- ROM (Read Only Memory) is a type of permanent, internal memory that is used solely for reading. All BIOS programs are stored in ROM.
- RAM (Random Access Memory) is a working memory in which analyzed data and programs are stored, while computer runs. It allows reading and writing data, and it is deleted/cleared when the computer shuts down.

This story leads us to the definitive question which underlines the entire course: how can we, with the appropriate use of technological innovation, cater to people are who are different in education? By different we refer to people who cannot adapt to a standardized educational system, despite possessing innate talent. By answering this question gradually we will be able to achieve the objectives of this school.

There are two type of individual in this world. One who can adapt themselves to societal norms and as such are rewarded with material success. Then there are those who are unreasonable and unable to fit in. According to George Bernard Shaw all the progress in society is based on these people. Based on a set of limited resources and ever growing users, only with innovation will we be able to distribute these goods more evenly rather than letting their accumulation confined to the few.

Our current schooling system too is standardized and has hardly evolved for ages. Instead of the person having to adapt to the system, the system should be flexible enough to adapt to the individual user. As mentioned earlier, at that time, the number of matriculation scholarships was a criterion of academic distinction. In our school there were about three hundred students who would appear for this examination. Of these who had adapted themselves well to the system would, distortion, a numbering about fifty or so, would be sponsored by the school in terms of fees? Another advantage would be that this group would be groomed by the best faculty. This may seem a little harsh but what choice did the school have with three hindered students and limited resources? If the limited faculty members were distributed for the entire student body the marks of all would have improved marginally, but there would be no scholarship students.

This no longer hold true! Technology allows us to address this and other educational issues. Of this elite group of students fifteen to twenty student were identified as sure in getting a scholarship and were further segregated. These students, of which I was one, had become versed in meta-cognition: they were able to learn on their own. Consequently, they were treated differently and enjoyed a great deal of independence, i.e. if they wanted to study on their own. Of the remaining two hundred and fifty they had to pay and make their own way. The talented students I had mentioned earlier were nowhere on the scene. It was surprising that a mediocre student like me could through hard work reach a position where these more talented students could not? In the sixth standard, those who could not pass would not be detained. A standard practice in private schools at that time, i.e. they would still be promoted to class seven. There was no feedback and parents would often wonder why despite failing a grade the child was still promoted? From the perspective of school they could not be detained since there were three hundred students coming from lower classes and there was not enough space to retain these failed students.

Apart from our school there was government pilot school in the same vicinity; a good school with young qualified faculty. It was a practice in that school that any failed students would not be retained. Still there was no feedback mechanism, in both type of institutions there was no feedback as to how a student was performing and what help he required. In one you would be promoted despite failing while in the other you would be dropped from the school for failing. Things have not changed much; there is still no feedback apart from annual exams and various tests in between. With technology the equation has changed, we can now
instantaneously gauge a child's academic level and requirements: we can see clearly where, how and why a student went wrong in a particular subject.

BIOS

BIOS (Basic Input/output System), can be defined as a program which is located in a separate ROM on the motherboard, and defines, as the name suggests, basic input/output system, is a good example.

Floppy Disk Drive

Floppy Disk Drive is used for storing and reading data stored on a floppy disk. Disk capacity is 1.44MB. Before memory stick and a wider usage of CD recorders, it was used as data carrier. 'Modern memory sticks have a memory capacity measured in GB while floppy disks only have memory capacity of 1.44MB, indicating that floppy disks are becoming obsolete.

General Principles of Teaching Aids

Principle of Selection

- They should suit the age level, grade level and other characteristics of the learners.
- They should have educational value besides being interesting and motivating.
- They should be the true representation of the real things.
- They should help in the realization of desired learning objectives.

Principle of Preparation

- As far as possible, locally available materials should be used in the preparation of an aid.
- The teachers should receive some training in the preparation of aids.
- The teachers themselves should prepare some of the aids.
- Students may be associated in the preparation of aids.

Principle of Physical Control

- This principle relates to the arrangement of keeping aids safely and also to facilitate their lending to the teachers for use.

Principle of proper Presentation

- Teaches should carefully visualize the use of teaching aids before actual presentation.
- Adequate care should be taken to handle an aid in such a way as no damage is done to it.
- The aid should be displayed properly so that all the students are able to see it.
- As far as possible, distraction of all kind should be eliminated so that full attention may be paid to the aid.

Topic 26 The Educational Challenge

This was and remains our greatest challenge and one which will only be further exacerbated by the growing population. How do we than handle students who dropout and those that do not have the time to attend school, i.e. most engaged in some menial employment? If we do not think about this, a time will come when this will becomes an issue with dire consequences for our nation. The problem is not as complex as it seems if we rely on technology.

Sound Card

Soundcard is a device used for sound creation and production by means of computer speakers.

CD-ROM and DVD Drive

- CD-ROM drive is used for reading CD media.
- DVD drive is used for reading DVD discs. DVD disc capacity ranges from 4.7 to 18GB.

Topic 27 Theoretical Learning and Actual Experimentation

We head back to our school and the ninth and tenth standards. At this level a lab environment is required, especially for Physics and Chemistry. When the time came to apply our theoretical learning to actual experimentation the excitement was palpable. Even those students who were bored with class lectures were really looking forward to the experiments. This entailed the Do part of learning which we had mentioned earlier. From this another point which is quite discernible is the unnaturalness of the lecture format.

Our instructor asked us to arrive on Sunday to the laboratory. We were told that each student would complete the experiment in varying times but we would not be allowed home until the experiment was complete. *The experiment required varying student times but a bare minimum understanding*. One wishes this insight could also be applied to theoretical classes but sadly that was not the case - it was just not possible at that time.

On the prescribed Sunday each students was there before time; in state of high intrinsic motivation, never the case with the regular lectures. Prior to the experiment we were told to study the background and theory of the experiment, which all students in their excitement failed to do so. Imagine their disappointment when the lab instructor told everyone that we would be doing a soft experiment focusing on the theoretical part. What we are trying to figure out, what equipment would be used, what might be expected results, etc.? This also proved to be exciting; most of the students were busy with thought experiments and were really immersed in the activity. Again the chain of Absorb, Do and Connect or Select, Organize and Integrate were all taking place in the virtual activity. What we can learn from this is the importance of making the absorbing part of education much more interesting through generating a Do component or making it activity based.

We were told by our Principal, that the Chemistry equipment was very expensive. Most of the equipment which was glassware was donated to the school. Come next Sunday and we all experimented. It was the highlight for us and all the children had tremendous fun. Unfortunately, there was significant breakage too. Some of us were so excited that we tried to create small labs at home. I saved up my entire year's pocket money and bought a small experiment set. It was really enjoyable to repeat the experiments at home and other students would come over. The sad part was that the lab facilities our class enjoyed were not repeated the next year, due to the excessive breakage. Some of the equipment was truly expensive and the school was unable to generate the required funds. This was not only the case with our school but almost all with a few exceptions. It is also equally valid today for a majority of the schools.

Graphic Cards

Graphics card is responsible for image processing and displaying it on a monitor. It has its own graphics processor and memory. Image quality depends on the strength of these components.

Modem and Connectors

- Modem enables computers to communicate via telephone lines. They connect computers to the Internet.
- Connectors or ports are slots visible in the back and the front side of a computer.

Topic 28 Demonstrate or Experiment

Some schools tried an alternate. They felt that the students should not be directly involved in carrying out the experiment. This would be carried out by a qualified instructor who would demonstrate the actual experiment to a class. Even our school this methodology was later followed. Despite the impersonal nature of a demonstration it is still enjoyable for students. The Absorb and Connect activities are still taking place and there is still significant involvement. For most schools even this methodology is still financially prohibitive. For example while gathering data from various schools in Pakistan to collate individual

student intelligence and their critical thinking skills. What is their understanding or is it rote learning. Granted that the Earth is orbiting around the sun and spinning on its own axis. The sun rises in the East and sets in the West. Do we just know this knowledge or do we understand this? How do we prove it through an experiment? This was the question which was asked in various universities, colleges and schools in Pakistan. The question was followed by a rational debate. No actual demonstration was identifiable. The question was also framed on Facebook and no answers were forthcoming apart from a professor at University of Engineering and Technology (UET), who said there was a demonstration at the National Science & Technology Museum - adjacent to the UET, Lahore. The very expensive demonstration consisted of a pendulum being hung on a building. How does that demonstrate the Earth motion?

Universal Serial Bus (USB)

Universal Serial Bus (USB) is used to connect various devices (mouse, keyboard, USB memory).

Serial Port and Parallel Port

- Serial port is used for example in connecting a mouse (labeled COM1 or COM2).
- Parallel port is used for connecting a local printer (LPT1 or LPT2).

Topic 29 Why is the Earth Orbiting the Sun

I remember in our Physics class at UET, first year, a very intelligent and naughty student once addressing the Physics professor and enquiring if he could demonstrate a lab experiment which would rationally demonstrate the fact that Earth spins on its axis and that the sun is not moving? The professor said we should go next door to the National Science and

Technology Museum and see for ourselves; since there is an experiment which demonstrates this. We were all very excited and a time was set for next week. At the museum we were very warmly received and shown a huge pendulum which was hung with a very long length of wire. The pendulum was driven by a motor and remained in perpetual motion. Naturally, a motor was required since otherwise it would stop due to friction. On the sides of the pendulum there were sticks, which upon collision would fall down. It would do so one side and then the other with a slight shift, this shift demonstrates the circular motion of the earth. This was stated with such authority that no student with the exception of one questioned the museum representative's assertion. He was told that he was at the back and how he could understand. Now the dilemma for most students was connecting the shift in the to and fro motion of the pendulum to the spin of earth. The expensive demonstration was quite futile. A better option would have been to carry out a thought experiment, which would also entail some absorption activity, much like Galileo did several hundred years back.

Network Port and Firmware

- Network port is used for connecting computers to a network.
- Firmware is used for connecting computers and audio-video devices (digital cameras, etc.).

Measurement Units

Bit (binary digit) is the basic unit used to measure the amount of information. A byte or octet contains eight bits.

- 1 KB (kilobyte)- 1024 B (approx. 1000 B)
- 1 MB (megabyte)- 1024 KB (approx. 1000 KB)
- 1 GB (gigabyte) -- 1024 MB (approx. 1000 MB)
- 1 TB (terabyte) – 1024 GB (approx. 1000 GB)

Topic 30 Thought Experiments

Let us take a look at some common Physics experiments. Newton's Law cannot be proven in a lab environment. With the exception of maybe NASA and some other laboratories the creation of a perfect vacuum or a frictionless environment is impossible. All of Newton's laws were based on thought experiments. With the aid of technology we can create computer simulations; transforming thought experiments into actual experiments. Galileo, when asserted that if you take a heavy object and a light one and drop them from a height simultaneously; if there is no air resistance, they will fall at the same speed and acceleration and will fall down simultaneously. Now this is completely counterintuitive; a feather would be accepted to fall lazily in waving in the air stream, while a lead ball would fall directly. Imagine his imagination and the thought experiment carried out. This is what he assumed; suppose the heavy object will fall faster, then let us tie the heavy object to light object with a thread. The combined object is heavier and will fall faster.

Now the two things are not tied jointly, i.e. there is some space between them. This would imply that despite being tied together the heavier object will fall first and lighter follow with the thread in between will come down slowly. He then concluded that the lighter object would exert an upward force since following behind the heavy object. Imagine his thought processes. Similarly, Einstein, through his thought experiment imagined Black Holes through the relevant mathematics. The concept was so strange that initially he assumed he had made a mistake. Since he could not physically observe them he imagined their existence with extreme doubt and hesitation as the concept was so mind boggling, all he had to rely on his workings.

Now we have the requisite telescopes /equipment which can prove his discovery.

The point of these examples is that a lot of exiting and interesting experiments cannot be done through physical lab experimentation. These have to be addressed through thought experiments and computer simulations. Most educational institutions cannot offer the required science labs, this gap can now be addressed and the excitement of discovery reintroduced.

Blu-ray Disc

Blu-ray disc (BD)- the successor to DVD, is an optical disk storage, it comes in different capacities, depending on how many layers it has and the capacity of each layer. Currently, the capacity of one layer is between 27 GB and 33 GB, while the overall capacity is the product of the number of layers and capacity of each layer.

Memory Card and USB Stick

Memory card is a type of flash memory used to store data in digital cameras, cell phones, MP3 players etc. USB Stick is a data storage device. It features small dimensions, relatively high capacity, reliability and speed. It belongs to the type of flash memory that remembers data, even when not under voltage i.e. they do not need electric power to maintain data integrity.

Limitations of ICT

- ICT supposedly endangers the child's social development.

- ICT is supposedly to endanger the child's intellectual development.
- Decreasing of child's emotional development
- Child's health is endangered.
- Misuse of ICT A
- Complete control over the child's usage of ICT is today
- Practically impossible
- Expensive

Chapter 4 Instant Feedback

Topic 31 Future Experimentations

In the last module we had dealt with science experiments and how working with one's hands, created great excitement in the students. Now we will try to classify these experiments; how they were at our times and how they will be in the future. The experiments we were conducting were not open ended. A certain prescribed output was required. I remember we were required to make oxygen and to do this were provided with a certain procedure. You needed to mix potassium chloride with manganese dioxide in a certain ratio. The mixture was placed in a hard test tube, heated, from which a pipe was attached passing through water to a cylinder. All the steps were well defined; if the desired outcome was not as prescribed, it meant you had not followed the procedure correctly. Despite being a lot of fun, the procedure was laid out and formulaic. There are no surprises and there was no room for creative thinking outside the procedure. Why is that only these two particular chemicals are used, is it same in large scale manufacturers? Can we not extract oxygen from the air, water, if so how? These experiments have utility, but do address the elements of surprise, wonderment, discovery, expectations, and frustration – a process which has led to all the great and innovations and discoveries.

Conversely, open ended experiments incorporate all these elements and no fixed procedure is prescribed. You are provide some guidelines the rest is up to you. Why is it that these types of experiments did not exist in our times? The answer lies in the nature of experimental labs available to us. It is impossible and probably very dangerous to allow students of ninth and tenth grade complete freedom in the typical physics or chemistry labs. So what has changed? We now have the technology to simulate experiments. In simulated experiment you have the freedom to mix whatever you want, even if the outcome is dangerous. You might cause a virtual explosion but that is the limit of it. The availability of technology has allowed us to create open ended experiments, which has opened an entirely new dimension of learning at relatively little cost (one time). This type of experimentation allow us to incorporate the elements of assessment, discovery, theory – all the three elements of absorb, do and connect are present in the learning process. Also real time assessment and results can be provided. These days a lot of sites are available on the internet where you can find these experiments (Google open ended experiments). The technical definition provided is "an open ended lab is where the students are given the freedom to develop their own experiments instead of merely, following prescribed guidelines from a labor elsewhere: making a lab open ended pushes students to think for themselves and think harder. The students here have to devise their own strategies and back them with explanations, theory and logical justifications. This not only encourages students to come up with their experiments, but requires them to defend themselves as their experiment if question???" Here unlike, close ended experiments, you are not solely indulging in the Do part of the learning process; the faculty of thinking is also incorporated. The two elements combined develop scientists.

Internal and External Hard Drive

There is a difference between an internal hard disk drive, which is embedded in the computer case, and an external hard disk drive, which is connected to a computer by using an appropriate cable or USB port, and is usually used to transfer data from one computer to another or for backup.

Mouse

Mouse is an input device that facilitates work with the graphical user interface (GUI). The mouse transmits hand movements and the screen displays the cursor (mouse pointer) movements. They are divided into mechanical and optical (with respect to a transfer movement), and wired and wireless (with respect to connection).

Topic 32 Open Ended Experiments

"In order to make this stage (experiment) open ended; the teacher may give a student a project with a purpose and not the procedure." In a closed ended experiment, within a lab environment, a strict regimen has to be followed. This is required since all precautions have to be in place to ensure student safety. An open ended experiment has a purpose, a goal in a project form. Apart from freedom granted to students they need to consult various sources including friends to successfully handle an open ended experiment. "Once the experiment concept is in placed whether developed by the students or teachers, it is time to design the experiment in accordance with the concept." I emphasize this point since the experimental design entails all the learning elements; do/select, absorb and connect associated with the learning process. The sad part is that this never implemented in our school systems, even the so called 'modern schools'. Experimental design never followed in accord with concept. All three elements do, absorb and connect were missing. "The teacher may choose to let the students study different experiment jotted down on a list and chose one: the teacher may drop hints and guide the students without choosing one for them." This allows for an element of choice for the students.

There can also be a blend of open and close ended experiments - you proceed thus far and then decide what needs to be done. Again technology allows us the option of customizing an experiment based upon the student's ability to learn and their progress. For a particularly gifted student the open ended element would be present in greater proportion in comparison to specified tasks and vice versa. Here we are not talking in the air. A book which I had shared earlier Disrupting Class, Johnson and , and from which the earlier descriptive text was taken contains what is actually transpiring in the United States, schools, today. The school of the future might be somewhat like this: the students upon entering the classroom (here we are not specifying a particular room a lab or otherwise) would go their chemistry benches, where there would be all the usual apparatus, test tubes, regents, etc. Here they will perform open ended experiments; seeing what changes occurs in pressure, volume and temperature of gases. The results may be completely counter intuitive. Earlier, we had specified the room where this would all take place. It turns out to be your bedroom. The experiment can be conducted at any time, any number of times and with anyone. The entire chemical laboratory is at your home and disposal.

To the earlier concept of absorb, do and connect or select, organize and integrate we add another element, on our own, for science subjects – observe. If we take away perquisite part of absorb, i.e. no information is provided, there is no lecture by the teacher, we can take the process one step further. Let us observe the sky, why is blue? Look at the lake, where do the waves come from? Why day and night alternate? Why seasons change? Why the rivers seek the sea? So from an initial observation we move to the select part. We try to find associated data which could be helpful in answering our query. Organize this data in terms of relevancy and finally integrate through find the right answer. Another aspect which needs to be noted is that we have built in the assessment part into the learning process (absorb, do and connect). This is not only relevant to science subjects but equally applicable to others. In our current system the learning and assessment parts are segregated.

Track Ball and Keyboard

- Trackball, unlike a mouse, is not movable. Hand movements are transmitted to the screen by rolling the ball which is located on the upper side of the device.
- Keyboard is used for data entry and issuing commands. They can also be wired or wireless.

Scanner

Scanner is used to load data (image, text, etc.) from the printed material into a computer. The result of scanning is an image, but with special programs, if we scan the text, we can get a text as a result. Software used to recognize text from image is called a text recognition tool.

Topic 33 Incorporating the Observe Element

Ask a child, these days, what is happening at your school and the answer will probably be exams and solely exams. These are then checked and the results handed back after a month. Similarly, the answer might be studying; the two aspects learning and assessment are devoid of any connectivity. Perhaps when this school system akin to a factory pipeline was incepted, it was requirement of that time, but it is unnatural. Assessment should be built in absorbing, doing and connecting; you should be unable to distinguish between the differing activities. What are the advantages of this approach?

In the traditional mode of learning the time for learning allocated to each student is equal. The assessment is variable with each student getting different marks; since each at a different learning stage. Their actual status is only known at end of period when assessment takes place. What we want, instead, is to make time variable and learning constant. A student will not be able to advance to the next module until they have mastered a particular module.

Technology provides us with the tools to do so now. In terms of science subjects you have a lab available to you continuously – time is variable. You can experiment anywhere and as many times as you want. Also, you are allowed to mistakes and discover new things. A side note; that mistakes, in learning, usually carry a lot of negative connotations. If you make a mistake your marks are deducted. This is in actuality incorrect, mistakes are essential in the process of learning and discovery. In fact, intelligent mistakes are essential for deep learning. This methodology of mistake is inaccurate; from a perspective of the person making the mistake he is completely right. The inaccuracy arises out of the mode of person thinking, which we need to understand.

Brigham Young University's virtual chemistry lab is currently serving one hundred and fifty thousand students. This is in a country where there is no resource deficiency and universities have access to large funding. They took two thousand and five hundred photographs, made two hundred and twenty videos and created simulated lab design through video game designing. The interface, critically, was not boring. By game design we shift from pure learning to student engagement which is fun and stimulating. The learning cycle of observe, absorb, do and connect part become an adventure in discovery. Naturally, the software is entirely openended but its parameters can be altered depending upon the student. This allows students to engage in experiments which are too costly and dangerous – this is just the beginning, who knows how far we will get in replicating reality in the future?

Touch Pad and Light Pen

- Touchpad is used for transmission of hand movement, but unlike working with a mouse, the user is the one who determines the position of the cursor by touching the touchpad.
- Light pen enables handwriting on screen and can be used as a mouse. It requires an appropriate monitor type.

Joystick

Joystick: mainly used in computer games. Unlike a mouse, it has many buttons which allow control over game objects.

Topic 34 Artificial Divisions and the Learning Pipeline

Here we travel back a little. The earlier learning pipeline of school, which ran like a factory, was linear in nature and contained artificial divisions. If one did not understand Algebra I, it did not matter; we moved to Algebra II, there were no stoppages. If we were discussing theory, that was it. We did not overlap this with lab work (practical) and vice versa. Each part of learning was segregated – "artificial divisions were the limitation of the past, we should not automate our mistakes using computers." With the available technology

we should not replicate our previous mistakes. “Now the following should be merged in a single interactive application, you cannot tell which is which.” There are no longer divisions, theory and practical merge in a single seamless entity, where assessment too continually takes place. This is where the absorb, do connect and select organize and integrate leaning process is complete and learning and assessment coexists. The entire process is one of fun and discovery.

With the advent of interactive learning the point we need to understand is that the amount of learning is fairly constant, while learning time and style are variable. This is completely converse to what transpired in an educational system earlier. Earlier we used of my alma mater, Muslim High School, Multan; which much like other schools promoted students from one class to another despite the fact that their performance was not satisfactory. All students are sustained for a year in class and then collectively pushed to the next level. Learning was variables and the drop out issue was significant. This dropout issue is critical and has potential disastrous consequences for society as a whole. “The pipeline keeps on moving; assessment does help neither in comparison, nor for determining if they have mastered the material – the pipeline moves in any case.” This becomes even more frightening if the material being taught is prerequisite to further material being taught.

Microphone

Microphone is a device that converts sound into an electrical signal, which can be stored on a computer. It is mainly used for recording sound, communication between players in online games, in combination with a web camera in video conferencing, for converting voice into text on a computer (speech-to-text processing (e.g., textual files or emails), etc.

Structure of Monitor

Monitor displays images from the computer, it enables us to see, work and control computers. In other words, working on a computer without a monitor would be inconceivable.

Common types of monitors, with regard to manufacturing technology, are the CRT and LCD. CRT monitors have been present on the market for a long time, and other technologies are pushing them out. They are based on cathode tube technology. LCD monitors use liquid crystal technology. In comparison with CRT monitors, LCD monitors use less electrical energy, do not emit radiation and their price is higher, however due to smaller dimensions, more attractive design and a good picture quality, they are pushing CRT monitors out of the market. Monitor size is expressed by the size of screen diagonal and measured in inches ("). Picture quality is expressed with the notion of resolution, which is a number of horizontal and vertical dots (pixels) (e.g. 1920x1080).

Topic 35 Chasing the Rabbit

We now turn to a story from a book, chasing the Rabbit by Stephen J. Spear. The author is a graduate of MIT. He was given a very unique problem: as you probably know the car was invented in the States, where commuting distances are great. The first mass production car was the Model T, invented by Ford, which was priced to be affordable to an average consumer. From there they spread throughout the world.

I remember when I was in the sixth or seventh standard, around 1961-62, the famous cars in Pakistan included Volkswagen, but that was German car. The American cars were huge gas guzzlers Ford, Chevrolet and other and were quite popular. Something strange happened later the Japanese came up with their Hondas and Toyotas. Soon they had the American cars beat outright. By 2008, no one could match Toyota’s total car production.

The project assigned to Spear was to study Toyota’s famous production/assembly line in the States and see what distinguished it from its American counterpart. After all the labor, raw material and environment was the same, what was the crucial difference? Why has the industry where cars originated lagged behind so badly behind the Japanese? The problem also had a deep association with learning, which we will find about later.

Stephen decided to visit an American factory in guise of a worker to understand t their issues. He requested for a simple task on the production assembly line. His assignment was to fit the front seat in a prescribed time (58 seconds) and format. Each cog in the assembly line was critical and deviation from time and format would imply the standstill of the entire assembly line which would result in huge costs. Despite the fact that he was a mechanical engineer from MIT and the process only entailed four or five steps which were so simple that he was communicated these verbally, he was unable to complete the assigned task. What went wrong? As in education, assessment, which parallels inspection in an assembly line, was missing from the process. Both pipelines cannot proceed to next stage when a particular process remains undone. For a car this would imply a missing or loose front seat and for a student missing mastery or understanding of the subject. What we are doing with the educational system if it was done to a car manufacturer the plant would shut down in a couple of days. Stephen was given fresh instructions and ample time to relearn the process. It took him one hour to do four seats. This is clear illustration of learning being variable in relation to time. This is what is happening in our schools.

In car assembly inspection is not done once the entire vehicle is assembled, it is necessary at each stage to ensure a complete and quality product. Similarly, this needs to be done education yet we persist in assessing students once the entire course is done, leading to variable learning outcomes, despite which we still push them further up the pipeline.

Stephen now moved to the Japanese factory (Toyota) to understand their competitive advantage. He requested for the same task, i.e. fixing the front seat and he mentioned that he previously done this in Detroit. He was given the same task but was totally taken aback by the method. Initially, he was not put on the assembly line was asked to just place the seat properly. No next step was provided until he had mastered this step. He was asked to absorb, do and connect, once mastery acquired the next step was revealed – no prescribed time was given. He could it master it an hour or take the whole day. This may seem like a small step but can lead to a huge growth for an economy or conversely a meltdown. So as with a manufacturing education needs a fixed outcome, time can and must be variable. **T**esting an assessment at every step is essential. What will be the results? Stephen was able to master the first step and subsequent steps correctly in the first attempt at the assembly line. This was the difference between Toyota and American car quality. “Assessment or inspection is interdependently woven into content delivery with fixed results. This minimizes the repair work at the end of the pipeline and there were essentially no dropouts. Without this the results would be catastrophic for Ford motors or a educational system.”

Another important aspect which needs to be understood is the feedback loop.

“Technology and software provide feedback loops to improve themselves for different kinds of learning.” Each person needs to learn differently and the feedback loop provided us with the requisite information as to how?

In summary assessment helps in learning and learning helps in assessment - we have divided the two. We need to combine the two to create the requisite impetus for creating student who will define our future through discovery.

Printer

Printer is a device used for printing data from a computer onto a paper. We distinguish between local printer (connected directly to the computer) and network printer (connected directly to network using a network card). Also, printers also differ according to print technology: dot matrix, laser, inkjet, thermal printer and plotter.

Dot Printer and Laser Printer

Dot matrix printers are the oldest, with the lowest price of print per paper, they are slow, make a lot of noise while printing, and are mostly appropriate for printing text.

Laser printers are similar to photocopy devices when it comes to technology. They have exceptional print quality, speed and are quiet. Downsides of laser printers are their high price and high price of toners.

Merits of HTML

- HTML is simple but powerful formatting language to use.
- The simplicity allows anyone to create web pages.
- HTML documents are device independent (works on any platform)
- The web pages can be linked together using links
- The pages can be updated at any time.

Demerits of HTML

HTML does not have any programming capabilities.

- Require expertise knowledge.
- Time consuming.
- Difficult to remember coding

Chapter 5 Higher Education

Topic 36 Quality Control and Assurance

We were discussing that in car pipeline, inspection couldn't be done after 10 steps as we do in education after 10 years assessment. This happens in every step in pipeline so that there wouldn't be any compromise in the car quality but we do compromise in education and we do assessment in the end of the year and still don't learn anything from the result and promote them in higher classes, this a blunder we are doing. Alright, what happened next? He went to the Toyota company after coming out of Ford Company and said I'll set the front the seat here as well, although I have leant from that factory about seat fixing but you also tell me about the steps verbally. Then he got surprised there, they told him to be mater in 1st step first and then we will tell you the second step before that we will not tell you the second step. This was the basic difference and what happens because of this? This change and give impact on the economy of countries; progress and demolishment. Toyota defeated all the companies of America because of these reasons. These are the minute decisions which need to be taken. But if we will say whoever wants to be educated and he will be. If he doesn't learn so it okay then. They told him take one hour or six hour or one day to master the 1st step. But till the time you don't show us the full command on 1st step we will not tell you the second step. Learning time is variable but outcome is fixed. Very basic thing is this audience; this is the purpose of this course. Summing up it in one line we can say that we should make the learning time variable and fix the outcome. Student should get time in all periods to learn and to make mistakes, give them chance and testing and assessment is essential. This is the lesson which we have learnt, if you do that you will see the difference, difference in cars and difference in the pipeline of education. Stew fixed all

his steps brilliantly and he is the same Stew who was unable to fix the seat in previous company. He was unable to fix seat in time and because of they stopped the pipeline and here lies the secret of excel of Toyota in company. You can clearly see more Honda, Toyota and Corollas rather than Ford. This is the major reason. Inspection is must on every step otherwise you can see the consequence. Now, I'm quoting Claton who says what should be our future? The result of testing and inspection, in education its assessment and in factory it's inspection. Testing and inspection at every step is essential. Assessment or inspection is interpedently woven into content delivery with fixed results. This should be our aim in the course of education by using technology. This minimizes the repair work in the end of pipeline and there were essentially no dropout after 6th class or 10th class, which these students are not able to study anymore. That is geostrophic for school students that is geostrophic for motors. Technology and software provides the feedback loops to improve themselves for different kinds of learners. There is another blunder that we try to teach everyone with same method, Learning styles come here. So audience summing it up, don't separate assessment and learning. Assessment helps learning and learning helps assessment that we have separated and experiments, we have separated completely. Experiments, labs of experiments, assessment and learning should be together like this. After that we will be able to produce scientist and they will be able to do discoveries.

Projector

Projector is a device used to project a computer image or other images from independent devices, such as DVD players, Blu-ray player, etc. onto canvas or a wall.

Inkjet Printers and Thermal Printer

- Inkjet printers have a high print quality (somewhat lower in comparison with laser printer), they are quiet while printing, and have low initial investment. Ink price, especially color ink, can cost as much as the printer itself. Printing technology is based on ink dispersion from container onto paper.
- Thermal printer, as its name states, leaves a print on the paper by utilizing heat. They use paper sensitive to heat, feature small dimensions; they are quiet while printing and relatively cheap. They are usually used for printing receipts, and owing to that they are called POS printer (printer of sale). Also, they are used as calculator printers and due to their small dimensions, as portable printers.

Topic 37 Out of Our Minds

Dear audience, we welcome to this module, as you know we are doing this module "use of information technology in Education" here is another book of KEN ROBINSON, his book out of mind is very famous. There is his book which published in 2015 that we also have ordered from that we will also tell you that what we could learn from that. I'm telling you a quotation from his book "we will not succeed in navigating the complex environment of pairing relentlessly to rear view mirror" here you need to focus that we are not looking forward but backward. From this book we will discuss many thing with and along with it the book that we discussed with you last time, we will do thing from it as well. So in the last module we have discussed you must have remember that we discussed there could be two types of classroom education. 1st we could teach everyone with same methodology so are we doing from past many hundred years or we need to accept that everyone learns, think and works with different methods, it's prior knowledge could be different absorption could be different, do with different method, connects with different style, so for that there should be customized software. We will continue this argument before using technology practically; we need to realize that what is future demands and how technology can fulfill them in these days? 20 years before it couldn't fulfill today it can and in 10 years it could do in better way. This is what we were discussing and this conflict between schools. In schools standardization and customization for students need to be enhanced. Now the author of this book gives us business definitions here he always tries to see the business module which is being used in these days in education. This is interesting and different may because usually in past in happened that in all education we matched the role of teachers in serving. After industrial revolutions many changes occurred here and in abroad as well. And school

education entered to industry after coming out from serving. If you see in 20 to 30 years public school had become reduce, its support had been reduced, and charity schools had been reduced. And business schools had been increased. Now I'm not talking about that this was good or bad but at least we need to understand it, that if it has become the business so we need to understand it's module and how could we make education effective by living in this business module. This is what we will discuss in our module.

Plotter

Plotter is used for printing large drawings (up to A0). They are extremely expensive and used only for professional purposes, such as in designing firms for printing technical drawings (blueprints).

Storage Devices and Touch Screen

- Storage devices, due to necessity for writing and reading data, they are classified as input/output devices.
- Touch screen (i.e. monitor sensitive to touch) is out device while displaying computer image, and at the same time input device while receiving manual orders.

Topic 38 Business Architecture

Audience, we will use some business and industrial terms in this module. In every production, which we produce, in that production there architecture place. This tells us that these things we need here and these things are need to be connected, like gathering the learning modules can make a book. Where we attached two modules that place is called interface. In interface we could see the questions which interrelates the previous and further tasks. A product design depends upon its little parts. Now you can prepare all designs in same factory or in different factories and after that gather them in one factory. Professor's quote could be explained that there could be conditions and something could not be prepared by preparing little parts from different factories they need to be prepared from same factory or same place. This could be critical that what can we divide where and how far we could divide it. Then the same company should develop the entire component either to develop different components. If architect follows this rule this could be beneficial in all industries like in pharmaceutical, car industries. If you see the air bus component all the parts were gathered from the different countries and it was not difficult to fit them together. This could be helpful and you give and module to make someone and whoever gives you cheaper module it could be helpful for you in working wherever you are working. Second module could be design in by any other specialized company. This modularity enhances your efficiency, this makes your pipeline easier and also highs up your cost as well.

Software

Software is, unlike hardware, intangible part of the computer. It consists of a sequence of commands, written according to strict rules. Programs are written by programmers, in various programming languages.

Operating System

Operating system is a program which manages computer hardware. First computers did not have operating systems; they had programs that were directly loaded into the computer (e.g.
punch cards). Today, computers have an operating system which loads into the computer's memory during its startup. Computer functions are based on its operating system. Within operating system, drivers (responsible for the functioning of a computer) and various utility programs (responsible for the functionality of a computer) are installed. The most famous operating systems are:

1. Linux (Debian, Ubuntu, Fedora, Knoppix) open source software
2. Microsoft Windows (XP, Vista, 7) proprietary software
3. Mac OS X (Cheetah, Panther, Snow Leopard) proprietary software

Topic 39 Modular Design

I give you an example of modular design, you must have seen light bulbs, in these days we are using energy savers, old people of 40 and 50 years must know about that bulbs which contained filaments and that was fixed in a socket, that socket is called interface. This socket is still same and now if you want to change the bulb design of you want fix tube light there you have to change the socket, but engineers have made such stuff which could be adjusted in same socket. The engineers have ability to make such technology where they don't need to change the socket but we can change the internal technology. This is how our learning should be like if you need to change the module and we will need to change the module so we should make it that flexible, to modify this. This is the usefulness of technology that we can improve our learning but for this we need modular architecture. We need to check that by changing one module the whole system should not be changed as I gave you example of bulb. When Stew started assembles his Model-T car, he made its shape from any other factory by steel suppliers. Now I'll quote from this book that the language is quite fine. Now when he started taking that from different steel suppliers that couldn't be fixed in that time technology was not that advanced and specification couldn't be meet exactly so ford realized this and now specifications are clear now they also take things from Pakistan. "Fords could not solve it by its own so it integrated. So he interfaces it and decided to make things in his same factory to solve the problem. He made a big factory to make thing in Detroit to make his engineers able to see and make new things according to the need. So the purpose of my saying is that modularity has its own specifications and conditions. Because for that we need to think that factory should be that much advance to see each and every module specification should be told strictly. Suppose if you go to buy a car in America they will ask about its specifications from engine to tire rims. You just tell us everything we will be customized thing and give you things according to you wish. This is the example of modular design that you can modify module according to the costumers will. This was impossible without modular architecture.

Application Software

Application Software (Utility programs) are all programs that users use to perform different tasks or for problem solving. Users, according to his/her needs, install the appropriate utility software. Computer functions and tasks that computers can perform are defined by the installed utility software. Utility software can often cost more than computer hardware unless the software is open source.

Text Processing Software and Spread Sheet Calculation Software

- Text processing software is used for creating and forming text documents and nowadays, they can contain images, charts and tables. Examples of such programs are OpenOffice.org Writer (open source software) and Microsoft Word (proprietary software).
- Spreadsheet calculations software is used for performing various calculations and presentation of results in charts. Examples of such programs are Open Office, Writer (open source software) and Microsoft Excel (proprietary software).

Topic 40 Customizing Education (Apple)

Another example I give you from the technology, which we use a lot and its pioneer say that the purpose of this technology is to make easier the learning and to customized. You must have guessed I am talking about apple computer. I-pad of apple and its learning applications are very good. But it has a fault in itself and that is its architecture. Although it's very beautiful machine and I use apple machines but their design philosophy is their where they don't want to compromise. This is their opinion where they don't want to compromise. The philosophy is this that apple always took care that the make whole computer at the same place. Their design is not modular, from the hardware to software and all applications, everything is interdependent. You can't change things from that system and you can't put any component from any 3rd party in its hardware. You already know its upside, apple is a

wonderful machine and I really like this. Downfall of this machine is that in apple there in no customization or modification this is why it is very much expensive. What other companies do! They get different parts from different vendors, from the cheapest vendor. Now here comes the example of dell computer, dell has no component of its own. It is customized according to your will but apple can't do this. In past dell didn't allow its product to the dealer. They used to send their products by post and before they used asked their customers about their wills. Peeling the cover of dell reveals that dell doesn't make any component. Different companies manufacture its component and dell invites the customer that they will give you customized machine in 48 hours. Such a huge difference could be examined here and still I'll prefer apple. Professor Claton is taking us to the education industry and tells us that this happens which industry is not mature but when company becomes mature company needs to be modified. As we said that learners could be difficult, their thoughts and learning styles could be different. Therefore, applications should be according to that.

Software for Presentation

Software for presentations is used to create professional presentations that consist of slides with graphical and textual elements. Such a presentation can afterwards be displayed as a "slide show" by using a projector. Examples of such programs are OpenOffice.org Impress (open source software) and Microsoft PowerPoint (proprietary software).

Magnifier and On Screen Keyboard

- Magnifier is used to enhance a part of the screen.
- In on Screen Keyboard text is entered using a mouse to click on the on-screen keyboard.

Importance of Audio Visual Aids

- They are best motivators
- Reduce verbalism
- Gives clear images
- Vicarious experience
- Provide variety in methods of teaching and learning
- Freedom to child
- Opportunities to handle and manipulate
- Contributes to increased retentively
- Based on maxims of teaching
- Helpful in attracting attention
- Helpful in fixing up new learning
- Saving energy and time
- Gives reality and vividness to learning situations
- Meeting individual differences
- Encouragement to healthy classroom interaction
- Spread of education on a mass scale

Topic 41 Learning Software

We gave you example of hardware now let me give you an example of software. That is more important for us because our interactive learning software will be software and can run on any hardware. In PCs Microsoft windows is very popular. Its architect her is pathetic. It is pathetic in the sense if you want to customize it according to your need. Then you will not use that software that is used by all because those features are not included in that software. Microsoft windows software is interdependent like apple hardware. Changing just

ten lines of code should necessitate, rewriting, by millions of other. So you cannot customize it but not in the case of LINEX and UNIX. You can customize that, different people can do additions in that software; third party can use, change and add it. So the economics of interdependence mandate standardization. Economy is our big issue if we are moving towards interactive learning. Then we need to know how industries did production economically without take caring quality issues by using economics. So the economics of interdependence mandate is standardization and we live with it. Most of us are unaware of it and how our lives might improve if we had easily configurable operating systems at our disposal. It is just a luxury that has never been feasible.
LINEX was operated on a big machine that was evolving since 60s and when reaches to 80s and 90s then LINEX was a logical conclusion. You cannot customize windows. UNIX technology has matured sufficiently. An open source operating system such as LINEX became feasible. LINEX architect her is modular, standardized and therefore can be customized. Witness how the open source programming community continually updates and enhances it kernel by kernel and line by line. It can be modified by anyone. It is the benefit of modular design that you can customize it.

Narrator

Narrator is commonly used by users with visual impairment - it can read text displayed on monitor, it tells current cursor position, and describes certain events, like warning and error messages generated by OS.

Function of Windows Speed Recognition

Windows Speech Recognition enables speech recognition, i.e. recognizes spoken word, transfers it to text and enters it into a document; therefore it enables you to dictate a text to a computer, to browse the web using your voice etc.

Topic 42 Disrupting Class and Business

Now I will again quote from disrupting class as I was discussing business module in which different businesses are discussed in formal ways and how these industries came to its peak after maturation and where education lies in it. One is solution shops and second is value adding process businesses. One other is facilitated networks. In solution shops there is and R &
D in which if you have a dispute then you will go to lawyer and he will provide you the solution. The lawyer has to generate solution according to your problem like a doctor who gives you medicine according to your deceases. It is called customization. Therefore, the lawyer diagnose the problem, recommend solutions, these from abilities to deliver values to customers are largely resident in the people who work there standardized processes are uncommon in a solution shop. We typically treat special education as a solution shop. Each student challenges or diagnosed and treated differently and uniquely. Manufacturing and retailing are the example of value added services. In value added services companies take material from different shops, mix them in a specific form then deliver it. Production and distribution of text books is also a VIP business. So, most schools currently operate in this VIP value added where there is standard process. Students are herded into a classroom at the beginning of the school year, value added to them and they are promoted to the next grade year end. Third type is facilitated networks like telephone, internet etc.

Computer Network

Computer network is comprised of at least two, connected, by wire or wireless, computers that can exchange data i.e. communicate. There are many reasons for connecting computers into a network, and some of them are:

- Exchange of data between users that have network access,
- Access to shared devices, such as network printers, network disks, etc.,
- Enables user communication and socializing, etc.

LAN (Local Area Network), WLAN (Wireless Local Area Network and WAN (Wide Area Network)

LAN (Local Area Network)

It is defined as, a network that covers a relatively small geographical area- it connects computers within a firm or household by wire.

WLAN (Wireless Local Area Network)

It is defined as, a network that covers a relatively small geographical area - it connects computers within a firm or household wirelessly.

WAN (Wide Area Network)

It is defined as, a network that covers a relatively large geographical area - it connects a greater number of computers and local networks.

Topic 43 Public Education and Value Addition

Now we are going to discuss our public education in which there is a momentum that totally trying to fit education in that value added fiercely that we discussed earlier. Let me tell you what happened, how you can see education in a big picture? First of all we design courses in different fields, then we design contents of courses, then we prepare text books. There are different models of text book publishing like USA said we will not publish any book, there are private companies and private writers. They publish those books by themselves with there money and bring it to the market. Then their board will decide which book they will use as a text book.

Now what is the result of this business model: Subject matter creates text books and other instructional tools which codify the concepts to be taught and the method used for teaching them.

Curriculum experts at state and at local level can make decision about which textbook to adopt. Teachers can delivered the content to the students typically and marks sometimes individually and the extent to which students learned what they were taught is assist to some extent. Teachers trainings sits in the middle and that reinforces how these steps work? Basically it is a factory model. When a big publisher publishes the book the benefit they take is that there is a fix cost and other is variable cos. Fix cost is high there when it will sale in mass scale the cost decreases. Therefore, the big companies can afford this but for this they will go to standardization where it can be fit or not.

Therefore, it is a basic fault of capitalist economy that big companies eat small companies there either they were possibly publishing the relevant books. In our country Punjab Text book board invite people to write books and they start writing standardized books. So it is called hard copy model. It will happen so for profit and publishing cost can be reduced by technology.

Client and Server

Relationship client - server is defined in the following manner: client sends requests and server responds to those requests. We can use Internet as the best known example. User's computer, connected to the Internet, sends requests to a certain web page (by entering page address into the Internet browser Address bar), and the server responds. Web page is loaded into the user's computer Internet browser as a result of server response. From this example, we can see that communication between client and server depends on connection speed (bandwidth).

Internet, Intranet and Extranet

- Internet (network of all networks) is a global system comprised of interconnected computers and computer networks, which communicate by means of using TCP/IP protocols. Although, in its beginnings, it emerged from the need for simple data exchange, today it affects all domains of society.
- Intranet is a private network of an organization to which only authorized employees have access (login and password).

- Extranet is part of Intranet, to which independent collaborators have access.

Topic 44 Text Books

Viewers there are an interesting thing that is discussed in this book is that. He said Physics book either it is for 9^{th}, 11^{th} or 12^{th} class must be written by Physics teacher. If he will be Physics specialist he will think differently and while writing the book he will think to write it at the mental level of that student. When that book will sent to the board for approval then it must be verified by Physics instructors. So for standardization there must be another subject specialist. We introduced a book in Oxford University Graph Theory and Algorithm where I was teaching graph theory. I have a psychologist named Yasir Hashmi and a student Komal Syed.
They observed if a student who has not mathematical background can be taught this subject?

Text book architected typically reflects the architect her of knowledge in a special domain or field. The book defines the sequence in which key concepts will be introduced and how they are related to one another? Text books often comes with teaching aids, physical examination and other material to enrich the learning experience because these experts are from intellectual elite in which they have same thinking. The type of brain whose wiring is most consistent with the methods to solve problems in Physics as domain experts has trained them. Text books and instructional materials are one of the primary vehicles in which these methods understanding and problem solving codified in Physics, Economics and Mathematics teachers tend to have high degree of logical, mathematical, intelligence and those who write text in those domain draw upon this intelligence time frame and explain the problem.

Different Way to Connect the Internet

- Dial-up Internet access method uses a modem (56k) and a telephone line.
- Broadband is characterized by a high speed data transfer, permanent access to the Internet, and thus the risk of unauthorized access to the network or your personal computer.

Different Connection Methods of Internet

Mobile

Internet is connected using a mobile network (GPRS, EDGE, UMTS, HSPA)

Satellite

These are commonly used in parts of the world where there is no proper infrastructure and there is no other way of accessing the Internet

Wireless (Wi-Fi)

Data is transferred between computers by using radio frequencies (2. 4 GHz) and the corresponding antennas.

Cable Internet

It is used in connecting to the Internet through television cable network using a cable modem

Broadband

It is characterized by a high-speed data transfer, permanent access to the Internet, and thus the risk of unauthorized access to the network or your personal computer. In the beginning of broadband Internet access, due to underdeveloped communication infrastructure, Internet providers charged based on the data traffic but not time spent on the Internet (unlike dial-up

Internet access). Today, in large cities, telecommunications infrastructure is developed, therefore Internet providers do not charge money based on the time spent on the Internet or the amount of transferred data but they do charge by access speed.

Topic 45 The Business of Textbooks

Textbook publishers appreciate that because individual students learn differently. They need differentiation options. The economics of scale stop to do this if the book is in printed form. If you eliminate pages the matter will be solved. What they to focus on development of different books for each type of intelligence. There volume per title, profitability to decline market or this is so disrupted model. Most of intellectual and financial energy of this formidable industry focuses on creating and commercializing still more blockbuster books for large undifferentiated masses of students. There included standardization that should not be happened. The question is to find the solution. Why there are so many engineers notoriously bad at spellings? Why do so many students like literature love to struggle to master in mathematics? Why so many labors are dump athlete in the classroom when their bodily kinesthetic code at the genius levels the game after the game. One critical reason lies in the textbook adoption process. I have discussed about modular approach which will not costly but it will standardize. It is a necessity in education. In school there are many things like building, curriculum, textbooks etc. and at the end learning comes. If there is no learning that is not school.

E-Commerce and E-Banking

- E-commerce is a form of trade that allows customers to browse and purchase products online.
- E-banking allows users to have control over their accounts (view balances and transactions), transactions from one account to another, credit payment, shopping vouchers for mobile phones etc. The benefits are saving time (which would otherwise be spent waiting in lines), lower service fees, and access from anywhere, anytime.

E-Government

In E-Government, information technology is used to provide better public access to government information, therefore providing citizens with their human right to information.

Different Classification of Projected Aids Projected Aids

- A projected aid is one which items to be observed is projected on a screen using electronic or Mechanical device.
- Very effective because movements can be added to sound and hence a realistic experience can be provided.

Magic Lantern

- It is used for projecting pictures from a transparency on a wall or screen**.**
- When the figure or illustration is very small and it is required to be shown to the entire class, A transparent slide of the small figure is prepared.
- Then, this slide is placed into the slide carrier part of the magic lantern.
- This magic lantern device projects it on the screen by enlarging its dimension and making the vision more clear and sharp.

Film & Film Projector

- Films are in the form of motion pictures.
- Films enrich learning by presenting a series of meaningful experience involving motion.
- Can enlarge or reduce the actual size of the object to suit the need.
- Film strips & Film strip Projector.

- A film strip is piece of noninflammable safely film, 35 mm wide.
- Length may vary according to requirement and can be up to about one meter.
- One film strip may contain 10 to 50 pictures frames.
- The pictures in film strip may constitute a connected series of drawings, photographs, diagrams or combination of these and illustrated a single sequence.
- The pictures may in color or in black or white.
- Some films strips are accompanied by commentary recorded separately, such film strips is called sound film strip.

Slides & Slide Projector

- The pictures or diagrams which are drawn in suitable medium is called slide. (Glass or Transparency)
- Slide can be enlarged by projecting it on a screen with a slide projector.
- Slide projector is an instrument equipped with a powerful light source and a carrier for holding slides of suitable size.
- Some slide projectors uses drums in which many slides can be loaded in proper sequence in advance.
- It is also possible to record the narration in a tape recorder that could be hooked up to the projector in such a way as to give the necessary commentary without the help of the teacher.

Episcope & Epidia scope

- Episcope is used for the projection of opaque objects.
- Pictures, photographs, drawings or an opaque material within the size of the platform of the episcope can be projected using Episcope.
- Episcope used to enlarge book diagrams and illustrate complex pictures.

  During Epi-projection the class room should be totally darkened in order to get a clear and bright image.
- Epidiascope can project opaque as well as transparent objects.

OHP

- This is called Over Head Projector because it projects the image behind and over the head of the teacher.
- The transparent visual is placed on a horizontal platform at the top of the light source.
- The teacher can place the transparent plate on the platform and write or draw on it anything that is to be visualized using suitable pen.

Television

- TV is very exciting and efficient means of mass communication.
- Educational Television programmes aims at education rather than entertainment.
- One teacher or specialist can render teaching session and pass information to million of viewers all over the world.

LCD Projector

- LCD (Liquid Cristal Display) is the most advanced and sophisticated projected aid.
- In the area of educational technology, we can replace all other projected and nonprojected aids with only a single LCD projector and computer system.

- It can present a topic by using computer made slide, graphs, pictures, video clips, movies and special effect.

DLP Projector (Digital Light processing Projector)

- Most advanced and sophisticated projected aid.
- Brighter image

- Lightest and smallest

Topic 46 The Business of Schooling

We are talking about core business of school and education which is learning, classroom learning, provides learning to students and if there is any deficiency in it then we can't say that school a school, that education system an education system and whole energy of the school, whole time of headmistress and teachers and whole time of board should be used on only one thing to improve the quality of student learning with or without using technology and if there is technology then it is very necessary to use it. There should be proper breadth and depth of it and it can also be introduce through technology because through physical presence of teachers we cannot offer many courses and a teacher cannot go to depth of anything. An electronic application can go to excessive depth. This is famous saying of someone "*Education is kindling of the flame not filling of the vessel".* You know that whose saying is this, by exceeding this , students are different, their interest are different , their learning style are different, by looking on all this if you forced them to rote it, it will not work, you know that it does not work, you know that in America how much school drop outs, here school are present, every child had same school, school provides books to every child, but why drop out is high, they made special programs, customized programs for it. The thing came again there, when they drop out, when any problem starts, when any disease come, when any problem emerged in the society, and when you know that how this problem break the society, then you take action against it. America starts customized programs for those Childs who become drop out from schools. So, that they can be re-engaged through personalized learning, so, listeners here in Pakistan it is not done, here those who are dropped are dropped due to their own mistake. We don't agree with it that they are dropped because of us, they are dropped because we fit them to one size. We do not care about their learning capabilities, we do not think about their special interest and style so, they are dropped. So, listeners an important question emerged that why not start with personalized learning in first place. In America they work when anyone drop out but now they work for others, but why we are not starting with personalized learning. Question is that why America does not start with personalized learning. It is said that it is very expensive. Now, we are going to answer this question similar modular architecture. Impossible as teacher cannot give personalized attention which is too expensive. There are two criticisms about it, that every teacher cannot give personalized attention to every child, in the same way we should keep one teacher to one child. Its going to be so expensive. Education is very expensive, this is the basic criticism on it, so listeners now I am going toward this book and the author says that you have standardized the education. Education is personal or it is nothing. You go to personal level and adopted their special needs or special interest or leave everything because standard method does not help anybody. He also says that it can be possible through technology that affords it for every child. Different content and learning style for every child. We have such tools: tool for promoting creativity, communication and collaboration become possible through technology.

E-Learning

E-learning consists of all forms of learning and/or knowledge transfer that are based on electronic technologies. This term will mostly be used to describe learning and/or dissemination of knowledge without direct teacher-student contact, while using ICT technology.

Advantages of E-Learning