



ICT SUPPORTED TEACHING AND LEARNING STRATEGIES

EBS 281

GEORGE SARDON G

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Course Title	ICT supported teaching and learning strategies						
Course Code	EBS 281	Course Level	200	Credit value	2	Semester	1
Pre-requisite							
Course Delivery Modes	Face-to-face <input checked="" type="checkbox"/>	Practical Activity <input checked="" type="checkbox"/>	Work-Based Learning <input type="checkbox"/>	Seminars <input type="checkbox"/>	Independent Study <input type="checkbox"/>	e-learning opportunities <input checked="" type="checkbox"/>	Practicum <input type="checkbox"/>
Course Description for significant learning (indicate NTS, NTECF, BSC GLE to be addressed)	<p>The purpose of this course is the need for students to understand the concept, nature and importance of ICT education. This will prepare students to become ICT skilled teachers and to get familiar with ICT supported teaching strategies. It will also involve preparing the students in selection of appropriate ICT facilities as well as getting acquainted with innovative trends in ICT education. It is also important for students to be aware of the challenges and barriers to the integration of ICT in Ghanaian senior high schools.</p> <p>(NTS 2b, 2c, 3a, 3c, 3e-3m, 3p; NTECF Pillar 1)</p>						
Course Learning Outcomes: including INDICATORS for Each learning outcome	Outcomes			Indicators			
	Describe the nature of ICT and its implications for teaching and learning. NTS 2c, 2e p. 13, 3h, 3j, p. 14.			explain the pedagogical implications to the teaching and learning process explain why we teach ICT in basic schools			
	Describe the roles of the teacher in the teaching and learning process NTS 2a, 2b, 2c, 2e. 2f; 3e-3o			Explain the roles of the teacher in the teaching and learning process			

	Describe innovative trends in ICT education NTS 2b, 2c, 3a, 3c, 3e-3m, 3p; NTECF Pillar 1		List innovative trends in ICT education	
Course Content	Units	Topics	Sub-topics (if any):	Teaching and learning activities to achieve learning outcomes
	1	Understanding ICT for teaching and learning	1.Theories of learning and ICT 2. What the research has to say: The impact of technology on teaching and learning 3. Literacy and new literacies 4. ICT and pedagogy	<ul style="list-style-type: none"> Lecture on the theories of teaching and learning and ICT
	2	Using ICT in the classroom	1. ICT tools for teaching and learning 2. Special needs and e-inclusion 3. Virtual worlds, online games and opportunities for learning 4. E-assessment and personalising learning 5. Mobile learning	<ul style="list-style-type: none"> Brainstorm with students the various ways by which ICT can be used in the classroom
	3	ICT for professional support and development	1. Teaching and learning with ICT: Overcoming the challenges of being a 21st century teacher 2. ICT tools for administration and monitoring pupil progress 3. ICT tools for professional development	<ul style="list-style-type: none"> Discuss with students the various means of how ICT can support teaching professional in the performance of his/her various duties

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UNIT I - UNDERSTANDING ICT FOR TEACHING AND LEARNING

1. Theories of learning and ICT
2. What the research has to say: The impact of technology on teaching and learning
3. Literacy and new literacies
4. ICT and pedagogy

Theories of learning and ICT

Learning theories have been developed over the past 150 years. There were only three learning theories that have been often utilized in the creation of instructional environments: behaviorism, cognitivism and constructivism. New learning theory connectivism that is "a learning theory for the digital age" was introduced as a theory of learning based on the premise that knowledge exists in the world rather than in the head of an individual.

Definition

- ▶ Learning theories are an organized set of principles explaining how individuals acquire, retain, and recall knowledge. By studying and knowing the different learning theories, we can better understand how learning occurs.

Types of Learning Theories

- Behaviourism learning theory (John Watson)
- Cognitive learning theory
- Constructivist learning theory
- Humanism learning theory
- Connectivism theory
- Diffusion of Innovation

BEHAVIORISM LEARNING THEORY

The life history of John Broadus Watson

John Broadus Watson was an American psychologist who established the psychological school of behaviorism. Watson promoted a change in psychology through his address *Psychology as the Behaviorist Views it*, which was given at Columbia University in 1913.

Born: January 9, 1878, Travelers Rest, South Carolina, United States

Died: September 25, 1958, Woodbury, Connecticut, United States

Known for: Founding behaviorism; Methodological behaviorism; Behavior modification

Influences: Ivan Pavlov; Edward Thorndike

Education: Johns Hopkins University, Greenville Senior High School, The University of Chicago, etc

What is Behaviourism?

Behaviourism is defined as a theory of animal and human learning that focuses on objectively observable behaviours and discount mental activities.

Other definitions of behaviourism:

Web's definition of behaviourism is an approach to psychology based on the proposition that behaviour is interesting and worthy of scientific research. It is a form of materialism, denying any independent significance for mind.

Wikipedia- it is an approach to psychology based on the proposition that behaviour can be studied and explained scientifically without recourse to internal states.

Standard's Encyclopedia of Psychology states behaviourism as being what organisms do and that is built on this assumption, and its goal is to promote this scientific study of behaviourism

To sum up everything, behaviourism is based on observable changes in behaviour. Behaviourism focuses on a new behavioural pattern being repeated until it becomes automatic

The Philosophical basis of behaviourism

1. The basic idea of Aristotelian associationism was that knowledge and the mind were built from basic sensations that were hooked together through association.
2. Initially, organisms have no knowledge. They are born with their minds tabula rasa, an erased or blank slate.
3. Knowledge is built by taking basic sensations like sounds, sights, odors, sensations of cold and warmth, connecting them together by the completely mechanical process of making sure that they occur together contiguously in time or space.
4. Complex ideas can be built from simple ones by the same mechanical process, and –so the theory goes- knowledge can therefore become as complicated and rich as might wish

Aristotle's ideas were really a theory of memory, how we recall things we have experienced in the past- as opposed to a theory of learning.

A group of English philosophers called the British Associationists took Aristotle's basic ideas and turned them into something like a real psychology. The British Associationists worked during the period from about 1650 to about 1850 and included such people as:

Hobbes, Locke John and James Mills and Harley. Associationism then came to America in the late 1800s.

In America, it is also mixed with a sense of practicality and an interest in the function and usefulness of behavior.

The consequences of this were the stimulus-response, behaviorist theories of John B. Watson, and later, B. F. Skinner.

Other important theories associated with the associationistic tradition were Thorndike, Dewey, Guthrie, Hull, Miller and Spence. Of all these, the behavioristic methods and philosophy of Skinner are probably most prominent and influential today.

5. Human nature, according to behaviourism, is neither good nor bad, but merely the product of one's environment.
6. It is not human nature but defective environments that are responsible for harmful things that people do to them and others.
7. To a behaviourist, there is no such thing as free will or the autonomously acting person; such ideas are only myths that may correspond to scientific observation.

The history of behaviourism began when Ivan Pavlov accidentally discovered the science of conditioned reflexes when studying the digestive process in dogs.

Watson developed Pavlov's laws of conditioning to establish the behaviourist perspective and classical conditioning.

Behaviourism as a movement in psychology appeared in 1913 when John Bradus Watson published the classical article '**Psychology as the behaviourist views it**'.

Watson believed that all individual differences in behaviour were due to different experiences of learning.

- Watson famously said: Behaviourism asserts that the only reality is the physical world that we discern through careful, scientific observation.
- People and other animals are seen as complex combinations of matter that act only in response to internally or externally generated physical stimuli

We learn, for instance, to avoid over exposure to heat through the impulses of pain our nerves send to our brain

- More complex learning, such as understanding particular topic is also determined by stimuli

Behaviourism development as a school of thought

Behaviourism is one of the principal schools of psychology. It was very dominant in the 1950s and the 1960s and is still influential today.

1. It is based on a scientific, experimental approach to psychology
2. The early behaviourists focused principally on how an organism behaved in response to stimuli
3. They did not consider what happened inside the organism
4. They wanted to understand how an organism could learn things, but they only referred to physical, not mental processes.

CLASSICAL CONDITIONING

The Pavlovian experiment involved, studying digestive reflexes in dogs, Russian scientist, Pavlov, made the discovery that led to the real beginnings of behavioral theory. He could reliably predict that dogs would salivate when food was placed in the mouth through a reflex called the "salivary reflex" in digestion.

Yet he soon realized that, after time, the salivary reflex occurred even before the food was offered.

TYPES OF SCHEDULE REINFORCEMENT

- Fixed Ratio Schedules: a fixed number of correct responses must occur before reinforcement may recur. For example: A student may be given a bar of Kit Kat chocolate for every ten mathematical problems solved
- Variable Ratio Schedule: the number of correct repetitions of the correct responses for reinforcement varies. For example: Rewards could be given after 3, 5, 9, and 15 mathematical problems solved

- Extinction: the weakening and eventual disappearing of emitted responses through non-reinforcement
- Generalization: the process where by a different discriminative leads to the same responses as previously conditioned and discriminate stimulus
- Discrimination: when a different discriminative stimulus does not lead to the same responses as the previously conditioned discriminative stimulus.

Other concepts under classical conditioning:

- Shaping: reinforcing successive movements towards desired behaviours.
- Schedule of reinforcement
- Fixed interval schedules: the target response is reinforced after a fixed amount of time has passed since the last reinforcement
- Variable Interval Schedules: the amount of time that must pass between reinforcement varies.
- Higher order conditioning: this involves another neutral stimulus which is introduced and associated with the conditioning stimulus, even further conditioning takes place.

The conditioned response trained to occur only after the conditioned stimulus now transferred to the neutral stimulus making it another conditioned stimulus

Now the second conditioned can caused the response without both first conditioned stimulus and the unconditioned stimulus.

- Watson and Raynor has shown that classical conditioning could be used to create a phobia. **A phobia is an irrational fear**, i.e. a fear that is out of proportion to the danger

Over the next few weeks and months 'Little Albert' was observed and 10 days after conditioning his fear of the rat as much less marked. This dying out of a learned response is called **extinction**.

However, even after a full month it was still evident.

Using John Watson's "Little Albert" Experiment, advertisers seek to classically condition consumers when they show products along with great-looking models or celebrities or in situations where people are enjoying themselves.

Advertisers reason that if the "neutral" product is associated with people, objects, or situations consumers particularly like (e.g. David Beckham), then in time, the product will elicit a similarly positive response.

Operant Conditioning

Skinner believed that the best way to understand behaviour is to look at the causes of an action and its consequences. He called this approach **operant conditioning**.

The difference between classical and operant conditioning

Whereas classical condition depends on developing associations between events, operant conditioning involves learning from the consequences of our behaviour.

Skinner wasn't the first psychologist to study learning by consequences.

THORNDIKE'S LAW OF EFFECT

Although operant conditioning was there, E. I. Thorndike did not believe that it was comprehensive because most behavior in the natural environment was not simple enough to be explained by Pavlov's theory.

He conducted an experiment where he put a cat in a cage with a latch on the door and a piece of salmon outside the cage. After first trying to reach through the cage and then scratching at the bars of the cage, the cat finally hit the latch on the door and the door opened.

Note:

With the repetition of this experiment, the amount of time and effort spent on the futile activities of reaching and scratching by the cats became less and releasing of the latch occurred sooner.

- Thorndike's analysis of this behaviour was that the behaviour that produced the desired effect become dominant and therefore, occurred faster in the next experiment,
- He argued that more complicated behaviour was influenced by anticipated results, not by a triggering stimulus as Pavlov has supposed.
- This idea became known as the law of effect, and it provided the basis for skinner's operant conditioning analysis of behaviour.

THREE LAWS BY THORNDIKES

1. Law of exercise: Repetition of exercise increases the probability of correct response. (With practice, associations are strengthened or weakened and the appropriate behavior is emitted more reliably).
2. Law of effect: A satisfying state of affairs following the response *strengthens* the connection between the stimulus and the behavior, *where as* an *annoying* state weakens the connection. (Associations are made only when the behavior is connected with a reinforcing consequence).
3. Law of transfer: The *conditioned* behavior will only occur under stimulus *conditions* similar to those in which the behaviour was *initially* learned.

B.F. SKINNER (positive response)

Skinner showed how positive reinforcement worked by placing a hungry rat in his Skinner box.

The box contained a lever in the side and as the rat moved about the box it would accidentally knock the lever. Immediately it did so a food pallet would drop into a container next to the lever.

The rats quickly learned to go straight to the lever after a few times of being put in the box. The consequences of receiving food if they pressed the lever ensured that they would repeat the action again and again.

IMPLICATIONS OF B.F. SKINNER'S THEORY ON POSITIVE REINFORCEMENT

Teachers may provide positive reinforcement by:

- Smiling at students after a correct response
- Commending students for their work
- Selecting them for a special project
- Praising students' ability to parents

B.F. SKINNER (NEGATIVE RESPONSE)

Skinner showed how negative reinforcement worked by placing a rat in his skinner box and then subjecting it to an unpleasant electric current which caused it some discomfort.

As the rat moved about the box it would accidentally knock the lever. Immediately it did so the electric current would be switched off.

The rats quickly learned to go straight to the lever after a few times of being put in the box

The consequences of escaping the electric current ensured that they would repeat the action again and again.

IMPLICATIONS OF NEGATIVE REINFORCEMENT BY B. F. SKINNER

1. Negative reinforcement increases the probability of a response that removes or prevents an adverse condition.
2. Negative reinforcement increases the likelihood of a behaviour, as does positive reinforcement

It implies removing a consequences that a student finds unpleasant.

3. Negative reinforcement strengthens behaviours because it stops or removes an unpleasant experience. For example, if you do not complete your homework you give your teacher an amount of money. You will complete your homework to avoid paying that amount of money, thus strengthening the behaviour of completing your homework.

- Students who fights are immediately referred to the principal
- Late assignments are given grade of "0".
- Being late three times to class results in a call to the parents
- Failure to do homework results in after-school detention (privilege of going home is removed)

SUMMARY OF CLASSICAL AND OPERANT CONDITIONING

In summary, learning through operant conditioning is the opposite of learning through classical conditioning as argued by Hanson et al (1986),

1. Operant conditioning occurs because of what happens after a particular behaviour, whereas, classical conditioning occurs in response to a stimulus in the environment
2. In operant conditioning, the organism first must behave in a certain manner; this is then shaped by the consequences of environment events that follow it.

WHAT COMPUTERS OFFER TO BEHAVIORISTS TO MAKE IT SUCH AN ATTRACTIVE TOOL

- Computers are very useful tool for learning enhancement. Concrete examples: modelling and creating expectations are made easier
- The computer is seen as electronic blackboard with the educator in control
- Computer use 'knowledge-based' models of the learning process; attempts to develop effective computer-based tutoring system have achieved limited progress towards the goal of helping learners to construct links between their procedural knowledge and conceptual understanding
- Computers captures the attention of the learner and has a constant repetition capacity, which maintains the attention of the learner throughout the lesson.
For example, drills and practice software for stimulus-response exercise, especially those based on operant conditioning and continuity.
- Computers are used in procedures to convey skills and knowledge from the educator to learners
- The use of computers in a range of teaching-learning (stimulus-response) situations facilitates groups working together.
- Computers motivates learners to learn. It does not matter how effective the materials are, if learners are not motivated, they will not learn.
- Instructional materials should try to use both intrinsic motivation (driven from within the learner) and extrinsic motivation (instructor and performance driven).

Keller proposed a model (ARCS-attention, relevance, confidence, satisfaction) for motivating learners during learning (Keller, 1983; Keller & Suzuki, 1988)

Therefore, software tasks should create learning experience for its own sake, resulting in an intrinsic motivation, and computer availability as a reward should create extrinsic motivation as a response.

THE BASIS FOR USING THE COMPUTER FOR BEHAVIOURIST LEARNING

The basis for using computer for behaviourist learning include:

- Educators present electronic multimedia stimulation to gain attention and response to inform learners of learning objectives, and to recall prior knowledge and new materials as presented virtual reality
- Software and instructional materials that facilitate the transfer of learning should be used to encourage application in different and real-life situations.
- Rehearsal exercises to maintain information in short term memory.
- Responses to stimuli are encouraged in software tutorials.
- Knowledge can be retrieved from long-term memory to working memory.
- Computers can provide programmed interactive assessment feedback and corrective information feedback for learners to apply their knowledge to concrete situations. For example, students are asked a series of short-answer questions.
- Giving the right answer let them proceed to the next question.
- Giving wrong respond triggers the display of the correct answer. This kind of immediate feedback is very important for the conditioning process.
- Computers provide informative feedback for reinforcement to the learner. Learners like to know how they are doing, and they like to contextualize what they are learning by applying the information in real life. This will indeed encourage electronic appraisal, performance enhancement and transformation of behaviour.

For example, Self-Check questions and exercises with feedback throughout a lesson are good strategies to allow learners to check how they are doing, so that they can use their metacognitive skills to adjust their learning approach if necessary.

- Computer can also provide objectives measurement and performance assessment. But this must have, programmed standardized recommendations.
- Through the use of computers, learning is interactive which promotes higher-level learning and social presence, and helps develop personal meaning.

- Interaction is also critical to creating a sense of presence and a sense of community for the learner, and to promoting transformational learning (Murphy & Cifuentes, 2001).
- Learners receive the learning materials through the technology, process the information, and then personalize and contextualize the information.
- In the transformation process, learners interact with the content, with other learners, and with the instructors to test and confirm ideas and to apply what they learn.

Weaknesses of behaviourist learning theory

- A weakness of behaviourism is that learners may find themselves in a situation where the stimulus for the correct response does not occur, therefore the learner cannot respond.
- A worker who has been conditioned to respond to a certain cue at work stops production when an anomaly occurs because they did not understand the system.

Strengths of behaviourist learning

- Learner is focused on a clear goal and can respond automatically to the cues of that goal.
- Learners are almost actively responding. Their actions are admittedly more reactive than proactive, typically answering questions and solving problems given by the instructor, but they are active.
- Behaviour principles feedback and speed practice are appropriate in interactive design

INFORMATIVE PROCESSING THEORY

George A. Miller provided two theoretical ideas that are fundamental to cognitive psychology and the information processing framework.

1. The first concept is "chunking" and the capacity of short term memory.

Miller (1956) presented the idea that short-term memory could only hold 5-9 chunks of information (seven plus or minus two) where a chunk is any meaningful unit. A chunk could refer to: Digits, words, Chess positions, or People's faces.

The concept of chunking and the limited capacity of short term memory became a basic element of all subsequent theories of memory.

2. The second concept is TOTE (Test -Operate-Test-Exit) proposed by Miller, Galanter & Pribram (1960).

Miller et al. suggested that TOTE should replace the stimulus- response at the basic unit of behaviour. In a TOTE unit, a goal is tested to see if it has been achieved and if not an operation is performed to achieve the goal; this cycle of test-operate is repeated until the goal is eventually achieved or abandoned.

The TOTE concept provided the basis of many subsequent theories of problem solving (e.g GPS) and production systems.

Within the field of cognitive psychology, **information processing is an approach to the goal of understanding human thinking.**

- It arose in the 1940s and 1950s.
- The essence of the approach is to see cognition as being essentially computational in nature, with **mind being software** and the **brain being hardware**.
- The information processing approach in psychology is closely allied to cognitivism in psychology and functionalism in philosophy although the terms are not synonymous.

Scope/Application

Information processing theory has become a general theory of human cognition; the phenomenon of chunking has been verified at all levels of cognitive processing.

Example: The classic example of chunks is the ability to remember long sequences of binary numbers because they can be coded into decimal form.

For example, the sequence 0010 1000 1001 1100 1010 could easily be remembered as 289CDA. Of course, this would only work for someone who can convert binary to hexadecimal numbers (i.e., the chunks are “meaningful”).

Human Memory

There are three basic questions to ask about memory:

- How are memories formed? (encoding)
- How are memories retained? (storage)
- How are memories recalled? (retrieval)

A. Encoding

- Encoding is an active process
- Requires selective attention to the materials to be encoded
- Another possibility is that where the filter occurs depends upon the task, the more attentional capacity that is available at any one time, the more one can use meaning and later input filter (selection) (Shiffrin, 1988)

NOTE

Memories may then be affected by the amount or type of attention devoted to the task of encoding the material.

There may be different levels of processing which occur, some are deeper than others, but there is no definition for what is meant by “deeper”.

Forms of encoding

- Structural encoding (emphasis on the physical structural characteristics of the stimulus) is a shallow level
- Phonemic encoding (emphasis on the sounds of the meaning of the words) is an intermediate level.
- Semantic encoding (emphasis on the meaning) is considered deep processing

B. Storage

Over the years, analogies have been made to the new technology of the day, to try and explain memory.

Current theories use a computer based model or information processing model. The most accepted model states that there are three types of stages of memory stages: sensory store, short-term store and long-term store.

Three Types of Memory Stages

1. Sensory store retains the sensory images for only a small part of a second, just long enough to develop a perception.
2. Short term memory (STM) lasts for about 20 to 30 seconds without rehearsal of the information.

With rehearsal, short term memory will last as long as rehearsal continues. Short term memory is also limited in terms of the number of items it can hold (see Miller, 1956). Capacity is about 7 items. Capacity can be increased by "chunking" (combined similar material into units)

Originally short term memory was perceived as a simple rehearsal buffer but it turns out to be more complicated: it is not limited to phonemic encoding. Loss of information occurs by other means than simply decay and displacement, etc.

Short term memory is better modelled by the CPU of a computer; it has the ability to store a limited amount of information in its cache ram while it processes it (a sort of working memory). So rehearsal helps get things into long term memory but there are different kinds of rehearsal:

Types of rehearsals

1. Maintenance rehearsal: simple recitation
2. Elaborative rehearsal: Meaning of the information is involved and this is more likely to cause shift has into long term memory.
3. Long term memory been suggested to be permanent: That nothing is forgotten, only the means of retrieving it is lost

Organizational structures of long-term memory

- a. Clustering: Items are usually remembered when they are together (like chunking in short term memory).
- b. Conceptual hierarchies: classification scheme is used when possible to organize memories.
- c. Semantic networks are less neatly organized bunches of conceptual hierarchies linked together by associations to other concepts.
- d. Schemas are clusters of knowledge about an events or objects abstracted from prior experience with the object. (we tend to recall objects that fit our conception of the situation better than ones that do not)
- e. A script is a schema which organizes our knowledge about our activities: if there is a script applicable to the event, you can better remember the elements of the event.

C. RETRIEVAL

- o Memory retrieval is not a random process
- o Cues can help with retrieval

Context cues: Is the process of reinstatement of context cues that accounts for the helpfulness of hypnosis in recall

Mood: State dependent memory refers to the improvement in recall that can occur when the same emotional state is created as was presented in the acquisition phase.

- o Memories are reconstructions (Barlett, 1932)
- o Schema theory and findings supports this notion as well

Forgetting

There could be a problem with encoding, storage, retrieval, or some combination of these. However, when meaningful material is used, the forgetting curve is not so precipitous. Measures used: **Retention** is the amount of materials remembered.

Theories of forgetting

1. Ineffective initial encoding ("pseudoforgetting") usually occurs because of ineffective attention in the acquisition phase
2. Decay: forgetting occurs because memory fades with time.
3. Interference: forgetting occurs because of competition from other information
 - a. Retroactive interference- new information interferes with what has already been learned
 - b. Proactive interference- old information interferes with what is being learned.
4. Retrieval failure : sometimes we cannot remember something which at another time we can remember it; perhaps this is because of the content cues or retrieval cues present at the time
5. Motivated forgetting: we may tend to forget things that we do not wish to remember (Freud).

Repressed Memories

Freud long ago suggested that memories repressed:

What are repressed memories?

Repressed memories are those which for some reason the individual keeps in the unconscious. Some people have suggested that memories which are "recovered" by therapists are memories which the therapists have created ("false memories"). These could be

1. Due to problems in source monitoring
2. Could be due to failures in memories reconstruction

COGNITIVE THEORY

Pure cognitive theory largely rejects behaviourism on the basis that behaviourism reduces complex human behaviour to simple cause and effect.

However, the trend in the past decades has been towards merging the two into a comprehensive cognitive-behavioural theory.

(LIFE HISTORY OF JEAN PIAGET)

- Proponent: Jean Piaget
- Born: Jean William Fritz Piaget; 9 August 1896; Neuchâtel, Switzerland
- Died: September 16, 1980, , Geneva, Switzerland
- Fields: Developmental psychology, epistemology
- Influences: Immanuel Kant, Henri Bergson, Pierre Janet, Alfred Binet...
- Influenced: Rabbi Shlomo Wolbe, Bärbel Inhelder, Jerome Bruner, Kenneth Kaye, L...
- Jean Piaget was a Swiss psychologist and genetic epistemologist.
- He is most famously known for his theory of cognitive development that looked at how children develop intellectually throughout the course of childhood.
- Contributors: Robert Gagne, David Ausubel and Jerome Bruner.

Definition of Cognition

Cognition can be defined as the act or process of knowing in the broadest sense.

Specifically, it is an intellectual process by which knowledge is gained from perception or ideas.

Cognition includes;

- D. Attention
- E. Perception
- F. Memory
- G. Reasoning
- H. Judgement
- I. Imagining

J. Thinking and,

K. Speech

DEFINITION OF COGNITIVE THEORY

Cognitive theory is a learning theory of psychology that attempts to explain human behaviour by understanding the thought processes.

It is an action-oriented form of psychology that assumes that maladaptive, or faulty, thinking patterns caused maladaptive behaviour and “negative” emotions.

General assumptions of cognitive theories:

- Some learning processes may be unique to human beings. (example, complex language)
- Cognitive processes are the focus of study. Mental events are central to human learning and they must therefore be incorporated into theories of learning.
- The objective, systematic observations of peoples’ behaviour should be the focus of scientific inquiry; however, inferences about unobservable mental process can be drawn from such study.
- Individuals are actively involved in the learning process. They are not passive receivers of environmental conditions, they are active participants in that learning process. In fact, they can control their own learning.
- Learning involves the formation of mental associations that are not necessarily reflected in overt behaviour changes.

Basic Principles and Approaches

- People contributed to their own psychological problem as well as behavioural symptoms.
- Individuals react to and interpret event in terms of their perceived significance: beliefs, expectation and attitude effect behaviour.
- Cognitive deficiencies can cause emotional disorders
- Faulty thinking is the cause of emotional and behavioural problems.

- Behavioural principles- Basic assumption of behavioural theories is that maladaptive behaviours are learned and can be unlearned, and that new, more adaptive behaviours can be learned.
- Cognitive principles- Basic assumption of cognitive theories is that maladaptive behaviour result from irrational or distorted way of thinking thought processes.
- The interacting-systems principles: it is helpful to look at problems as interactions between thoughts, emotions, behaviour and physiology and the environment in which the person operates.
- The empirical principle: it is important to evaluate both our theories and our therapy empirically.

History of and assumptions of cognitivism:

- Edward Tolman proposed a theory that had a cognitive flair. He was a behaviourist but valued internal mental phenomena in his explanations of how learning occurs.

Some of his central ideas were:

- Behaviours should be studied at the local level
- Learning can occur without reinforcement
- Learning can occur without a change in behaviour
- Intervening variables must be considered.
- Behaviours is purposive
- Expectations of past behaviour.
- Learning results in an organized body of information

Based on his research of rats, Tolman proposed that rats and other organisms develop cognitive maps of their environments. They learn where different parts of the environment are situated in relation to one another.

The concept of a cognitive map also called a mental map has continued to be a factor of research

Piaget's ideas about human learning

- People are active processors of information
- Knowledge can be described in terms of structures that changes with development.

Piaget proposed the concept of schema.

- As children develop, new schemes emerge, and are sometimes integrated with each other into cognitive structures.
- Cognitive development results from the interactions that children have with their physical and social environment

According to Piaget, people interact with their environment through to unchanging processes known as assimilation and accommodation.

Constructivist Learning Theory (Personal History)

Proponent: Jerome Bruner, an American Psychologist

- Born: October 1, 1915, New York, New York, United States
- Died: June 5, 2016, Manhattan, New York, United States
- Known for: Contributions to cognitive psychology and educational psychology; Coining the term "scaffolding"
- Education: Harvard University (1941), Duke University (1937)
- Spouse: Carol Fleisher Feldman (1987–2006)
- Important contributors : Jean Piaget and Lev Vygotsky

Constructivism

Constructivism argues that humans generate knowledge and meaning from an interaction between their experiences and their ideas. **Constructivism theory views learning**

1. As a process in which individual construct meaning basing on prior knowledge and experience.

It has influenced a number of disciplines, including psychology, sociology, education and the history of science

During its infancy, constructivism examined the interaction between human experiences and their reflexes or behaviour patterns

2. Constructivism is not a specific pedagogy
3. Teachers are facilitators not directors.

Key Points of Constructivism

1. Constructivism is a child-centered, rather than curriculum based
2. Focused of teachers should be on the development of a suitable environment for constructing knowledge rather than for its transfer
3. Constructivism focuses on knowledge reproduction
4. It is a belief that one constructs knowledge from one's previous experiences.
5. Everyone's view of the external world differs from others because of their unique set of experiences, the ideas and interests of children drive the learning process.

6. Students construct new understanding using what they already know, and prior knowledge influences what new or modified knowledge they will construct from new learning experiences
7. Learning is active rather than passive
8. Children may need different experiences to advance to different levels of understanding
9. Focus on student-centred learning may well be the most important contribution of constructivism
10. The ICT based technological and pedagogical framework will help to engage students' curiosity and initiate learning, leading to critical and analytical thinking'
11. Teacher serves as facilitator

Linkage of ICT to Constructivism

ICT

- A. Generates new ways of teaching and learning through the use of computers
- B. It constitutes a shift from the teacher centred to learner centred pedagogy
- C. It decreases memorization and rote learning
- D. It increases critical thinking for learners
- E. Encourages activities in small groups of learner, also the pace of these activities are determined by learners.
- F. ICT enhances integrative learning that is transforming theories to practice.
- G. Encourages interactives and cooperation among students, teachers and expertise regardless of where they are.

How to Use in ICT

- Active participation of learner rather than just telling them answers
- By collaborative activities that embed learning in a meaningful context and through reflection on what has been learned through conversation with other learners
- Cognitive tools are designed to make learners think harder about the subject being studied while generating thoughts that would be impossible without the tool.

Challenges to the use of ICT (BARRIERS)

- Shortage of well qualified teachers
- Expensive ICT devices
- Opportunity for training are mostly limited to few urban centres
- Shortage of infrastructure. E.g. electricity, internet connection and ICT buildings
- Syllabus is out of date with respect to the evolution of technology
- Poor Government policy

Communication in a constructivist classroom

- The interaction in the class is reciprocal rather than teacher-centred
- Students are engaged with their activities rather listening
- Teacher asks questions rather than giving directions
- Students' voices are heard rather than the teacher's.
- Students help each other

Evidence of Constructivism in Use Today

- Experiential teaching
- Self-directed learning
- Reflective practice
- Perspective transformation and transformative learning

Underlying Assumptions of Constructivism

- Jonassen (1994) proposed that there are eight characteristics that underline the constructivist learning environments and are applicable to both perspectives:
- Constructivist learning environments provide multiple representations of reality. Multiple representations avoid oversimplification and represent the complexity of the real world.
- Constructivist learning environments emphasize knowledge construction instead of knowledge reproduction.
- Constructivist learning environments emphasize authentic tasks in a meaningful context rather than abstract instruction out of context
- Constructivist learning environments provide learning environments such as real-world settings or case-based learning instead of predetermined sequences of instruction.
- Constructivist learning environments encourage thoughtful reflection on experience.
- Constructivist learning environments "enable context- and content- dependent knowledge construction."
- Constructivist learning environments support "collaborative construction of knowledge through social negotiation, not competition among learners for recognition."

Implications of Constructivism for teaching and learning

- If students must apply their current understandings in new situations in order to build new knowledge, then teachers must engage students in learning, bringing students' current understandings to the forefront.
- If new knowledge is actively built, then time is needed to build it. Ample time facilitates student reflection about new experiences, how those experiences line up against current understandings, and how a different understanding might provide students with an improved (not "correct") view of the world.
- Teaching cannot be viewed as the transmission of knowledge from enlightened to unenlightened;
constructivist teachers do not take the role of the "sage on the stage." Rather, teachers act as "guides on the side" who provide students with opportunities to test the adequacy of their current understandings.
- If learning is based on prior knowledge, then teachers must note that knowledge and provide learning environments that exploit inconsistencies between learners' current understandings and the new experiences before them.

Diffusion of innovation (Definition)

- ▶ Diffusion of innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread.

! Diffusion of Innovation (DOI) Theory, developed by E.M. Rogers in 1962, is one of the oldest social science theories.

Rogers proposes that four main elements influence the spread of a new idea: the innovation itself, communication channels, time, and a social system.

This process relies heavily on human capital.

The innovation must be widely adopted in order to self-sustain. Within the rate of adoption, there is a point at which an innovation reaches critical mass.

The categories of adopters are

- Innovators
- early adopters'
- early majority
- late majority and
- laggards.'

Implications of diffusion of innovation

- Identify and clearly communicate the observable benefits demonstrated in research and practice, repeatedly and by whatever means available, of adopting an innovation.
- Get opinion leaders on your side. Seek out the support of influential colleagues and administrators who are likely to become early adopters of an initiative and willing to spread the positive word to others.
- Marshal organizational support by advocating for policy and procedural changes that will facilitate adoption of the innovation.
- Take advantage of social networks, electronic channels, and other engaging ways to make the case for change.

What are the *implications of cognitivism* and especially Information Processing for ICT use in teaching and learning? Some of the implications are the following:

1. Learning is basically a process of meaning making. The learner constructs knowledge but individually. Hence, ICT use needs to be directed towards engaging the learner with the content in a way that she is enabled to recall earlier relevant learning and use it for anchoring new learning. For example, for teaching the implications of learning theories for ICT use, we are referring to the theories of learning you have learnt earlier but in an online course, you may create hyperlinks and new concepts may be hyperlinked to the content taught earlier. You may have come across such content with hyperlinks, in wikis, that lead to explanations and / illustrations for the hyperlinked word.
2. Using ICT for repeatedly playing a particular content like a poem or a song may help in making it a part of LTM but you need to check whether the learner has understood the concept, as the content learnt this way may not necessarily lead to meaningful learning, and may be lost.
3. It is necessary to draw learner's attention for learning to begin. If we fail to draw the learner's attention and arouse interest in learning, the information we provide may be lost. Therefore, we use methods like using an interesting introductory message prior to teaching the content, apart from techniques for drawing attention like underlining, using bullets, creating boxes with text, and the like.
4. Learners need to be active for learning. Hence, activities requiring them to search for information, examine it, evaluate and select appropriate content, analyze and synthesize it, draw inferences, that make them more active than situations in which they are recipients of the information and inferences drawn by teachers and others, support learning. Hence, learners need to use ICT more while in a classroom teacher usually are the main users of ICT and learners remain passive.
5. Goal oriented and self-directed learning requires clear objectives. For example, the units of this course begin with clear objectives of teaching and learning. Hence, while developing an audio/video/online course/multimedia CD you should be clear about the goals of teaching and learning.

6. Learning requires scaffolding. Hence, even while teaching through ICT, advance organizers can be helpful for rooting new learning to earlier one by comparing and contrasting old and new ideas, or by simply linking them.
7. Learners do not need to be 'trained' as they can make meaning and be self-directed learners, who can take charge of their learning. This, however, requires that irrespective of the medium used for delivering it, the self-learning material is structured, focused and as per the learner's abilities and needs. It should also raise questions that elicit critical thinking. The feedback from teachers may also include comments that encourage thinking.
8. As the learner needs to process information, the content, for instance of an online course or any unit of a teaching-learning process, should have a well-defined and coherent structure, logical sequencing, summary, relevant examples, analogies, concept maps, and other such features for facilitating information processing.
9. Though learners engage in information processing, the importance of drill and practice remains. For examples, we may watch a video showing a process, understand it and reproduce it but practicing it will lead to perfection and naturalization.

Implications of behaviorism on ICT use in teaching and learning

1. Learning experience needs to be enjoyable: While using ICT for teaching we need to understand that once the novelty of the device wears off, learners may lose interest unless the content taught is interesting. Hence, children may be excited as you take them to a smart classroom and use computers but to sustain their interest you need to teach in a way that they enjoy learning.
This means educational games should have entertaining and motivating content. This explains the reason for designing educational games, using computers and mobile devices, in a way that learning experiences educate as well as entertain and keep the learners interested.
2. Reinforcing desired learning experience: Skinner is of the view that teachers can be more effective if they act as behavioral engineers and shape behavior through reinforcement (Parsons, Hinson, Brown, 2001). Therefore computer assisted instructions are developed not just for teaching but also for, assessing learning and providing feedback that reinforces the desired behavior. You may have also played games on computer or mobile phone and got feedback about your performance in the form of scores, congratulatory messages and so on. When you design ICT mediated learning experiences, you need to keep in mind the need for providing such reinforcement verbally/textually/ pictorially.
3. Practice for learning and its retention: Computer Assisted Instructions often include provision for drill and immediate feedback. This reduces the chances of extinction of response to the stimulus.
4. Learning is goal oriented and need based: Formulating clear objectives for teaching-learning purposes and sharing them with learners is important. For example, before engaging children in an addition drill, we may tell them that this will help them in learning addition and subsequently multiplication and thus enable them to calculate the cost of the things they buy.

What are the *implications of constructivism* for teaching and learning with ICT?

Some of them are the following:

1. **ICT use for enhancing learner engagement:** ICT should enhance the level of active participation of learners in learning processes. The content taught, therefore, has to be interactive that questions, requires learners to critique, contextualize it by bringing into play their own experiences, for cognitive engagement of learners. Activities requiring collaborative work with peers and provision of support from teachers will enhance learners' social engagement.
2. **ICT use for supporting knowledge construction:** ICT needs to be used for supporting knowledge construction by learners. For example, ICT may be used just for downloading images of food chain or it may be used for searching for information about the birds and animals of a locality and their food habit; downloading images of the birds and animals, images of necessary icons like arrows, and using the images to organize the organisms in a way that depicts a food chain.
3. **ICT use for making learning a social process:** Unlike behaviourists and cognitivists, social constructivists consider learning as a social process. Hence, ICT needs to be used for learning collaboratively. Activities requiring teams to solve problems, making discoveries and using ICT for collecting, processing, managing and sharing information and the resources created are, therefore, to be planned for teaching. We know that many children today use social media and, often for carrying out school projects and assignments they become communities of practice that engage in computer based collaborative learning. *However, do schools recognize, support and channel such informal and unguided practices for collaborative creation of content?*
 There is an emerging need for pedagogies that harness technologies to promote collaborative learning. Therefore, while using ICT for teaching and learning purposes, you need to see that it brings together learners, and helps them share files, data and messages for negotiated meaning making.
4. **Teacher's Role:** A teacher can develop a constructivist environment by creating learning communities that comprise students, teachers and experts who are engaged in authentic tasks in authentic contexts (UNESCO, 2002). This is possible with ICTs that for instance

enable simulations and create virtual world for collaborative learning. Within the virtual environments modelled by ICT, virtual communities of practice can carry out real time actions, collect data from different locales, think, act and reflect collectively and make decisions and solve authentic problems. For example, Second Life is a virtual world that allows players to socialize with other participants, interact with objects, participate in activities, take decisions and learn. Some other examples of virtual world created for learning are Sciencesim for collaboratively learning science.

5. **ICT use for self-directed learning:** Although collaboration is important for learning, reflection, metacognition and hence self-directed learning on part of individual learners is also important. Therefore, the online course you teach may require your learners to maintain a reflective journal for recording their reflections on their learning experiences. Reflection may also be a collective process with the team reviewing experiences and revising the learning process.
6. The teacher's role is not passive as learners construct knowledge. S/he needs to guide and facilitate learning. S/he has to play an active role in formulating the objectives of teaching, select and organize the content to be taught, chose suitable pedagogy and technologies. S/he also has to design the content/structure the learning experiences and support and monitor learning on a continuous basis and also see that ICT use is focused and ethical.

UNIT II

Using ICT in the classroom

The concept to be studied are?

1. ICT tools for teaching and learning
2. Special needs and e-inclusion
3. Virtual worlds, online games and opportunities for learning
4. E-assessment and personalizing learning
5. Mobile learning

ICT tools for teaching and learning

ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises.

ICT tools they are hardware, software and networks. Comms that enhance teaching and learning in the classroom.

Composition of ICT tools for teaching and learning

ICT devices that are used in teaching and learning are divided into:

- hardware,
- software and
- network communication.

Examples of hardware devices that are used for teaching and learning are?

hardware ICT tools

desktop and laptops

projectors

digital cameras

printers

Photocopier

tablets

popplet

pen drive

iPod

iPad

web boards

scanners

microphones

interactive white board

dvds and cds

video games

Advantages of using ICT tools in teaching and learning

- ICT tools helps promote individual learning
- It bridges the gap between teachers and students
- It encourages group learning
- It simplifies teachers work
- Promotes higher order thinking

Disadvantages of using ICT tools in teaching and learning

- It creates distractions in the classroom
- It is expensive
- Requires training. Both teachers and students need extra training on how to use the various educational technologies.

Factors to Consider in using ICT tools for Teaching and Learning

ICT issues planners must consider the following:

- Considering the total cost-benefit equation,
- Supplying and maintaining the requisite infrastructure, and
- Ensuring investments are matched with teacher support and other policies aimed at effective ICT use.

SPECIAL NEEDS AND E-INCLUSION

(INTRODUCTION)

Some pupils may have learning difficulties caused by a physical disability, a problem with sight, hearing or speech, emotional or behavioral problems, a medical or health problem or difficulties with reading, writing, speaking or numeracy. The use of ICT is essential in enabling pupils with special educational needs to gain access to the curriculum.

The ICT tools helps pupils with special needs to

1. Overcome their differences in other for them to participate fully in the normal classroom with their peers. These ICT hardware for special needs pupils is called **Assistive technology**

What is e-inclusion?

E-inclusion is the use of technology to promote the inclusion of students with disabilities. schools must provide technology that caters for the specific needs of each pupil.

ICT makes it easier for all students to see, hear and use a computer and to personalize their computers to meet their own needs and preferences irrespective of their disability

Types of impairment of pupils with special needs

Before determining how ICT tools can benefit pupils with special needs, it is important to understand the types of impairment and how those impairments impact computer use.

Types of impairment

1. Vision impairments
2. Learning impairment
3. Mobility and dexterity impairments
4. Hearing impairments and deafness
5. Language impairment

Special Needs Education (SNE) ICT tools for teaching and learning teachers dealing with the SNE will require special ICT tools like

- text magnifier
- large prints
- audio books
- talking word processor
- Head wand
- keyboard for cerebral palsy
- braille keyboards
- typing aids

VIRTUAL WORLDS, ONLINE GAMES AND OPPORTUNITIES FOR LEARNING

A virtual world is a computer-based online community environment that is designed to be shared by individuals so that they can interact in a custom-built, simulated world.

Virtual worlds are recently becoming the new phenomena in that they enable people to meet and socially interact with others in a variety of online environment.

With educational virtual worlds like Kaneva, Cybertown, Mycosm, Active Worlds, Blue Mars, etc opens up new opportunities for learning, collaboration and understanding.

Virtual worlds enable teachers to engage large numbers of students in ways that are not possible in real world. This means greater levels of engagement and retention.

Virtual worlds is making online distance education fun since teacher and pupils all over the world can meet in a virtual classroom to learn with a greater level of engagement.

Benefits of virtual world (classroom)

1. Effective worlds allow the learner to visualize learning scenarios through active engagement.
2. The key to efficacy of virtual worlds is interactivity, rather than immersion. This simply means that students learn by doing in this environment.
3. Ease of navigation through the world seems to make the user experience better and improve learning motivation
4. Teacher's best serve as facilitators in the discovery process, rather than problem solvers.
5. Virtual worlds build learning through interaction and construction, rather than by assimilation as with traditional instruction.
6. In addition, virtual worlds can be used to effectively integrate media, such as:
 - e-books

- hyperlinked articles
- objects to manipulate, such as artifact
- interactive calendars or blackboards
- surveys, where feedbacks is sent via emails

Online Games

Online games can prove to be a treasure trove of learning opportunities, and there are a variety of content-areas, age ranges, and skill level to choose from.

Some examples of online games that teachers can use as a tool in their arsenal;

- a. sheppard software
- b. PBS kids games
- c. Funbrain,
- d. Poptropica
- e. BBC schools:Games,
- f. Academic skill builders, etc

Educational online games enable pupils to practices what they have learnt through repetitive timed learning drills that provides immediate feedback, arouses their curiosity whiles they play and learn at the same time.

BENEFITS OF ONLINE GAMES TO LEARNERS

1. Increase a child's memory capacity

Games often revolve around the utilization of memorization. This not only relates to games whereby children have to remember aspects in order to solve the game, memorize critical sequences, or track narrative elements.

2. Helps with fast strategic thinking and problem-solving

Most games require children to think quickly. Moreover, they have to utilize their logic in order to think three steps ahead in order to solve problems and complete levels. This is great because it is something which helps children in later life as they develop their logic, their accuracy and their ability to think on their feet and outside of the box.

3. Develops hand-eye coordination

Games that require children to use a gamepad or a keyboard and the mouse to operate the games can help develop hand-eye coordination. This is because children have to look at the action on the screen whilst using their hands to control what is happening at the same time.

-Beneficial specially for children with attention disorders
research has revealed that online games can actually help children who experience attention disorder.

E-ASSESSMENT AND PERSONALISED LEARNING

E-assessment

E-Assessment (electronic assessment) is the use of technology to manage and deliver assessment.

Most widely-used forms of e-assessment are:

- a. online tests
- b. quizzes
- c. exams
- d. e-submission
- e. e-marking
- f. Self-assessment
- g. Peer-assessment.

Assessment plays a key role in learning. E-assessment tools such as playposit and TED-Ed: Lessons Worth Sharing helps the teacher to assess their pupils.

E-assessment covers a wide range of activities so can have a wide range of benefits. Some of these benefits are:

- gives immediate feedback, tailored to help students improve their knowledge and performance
- Provide access for students in different geographical locations and at different times.
- Provides sophisticated reporting, allowing you to refine the exercise or identify areas in which more instruction is needed.

In personalized learning, E-assessment tool like Kahoot gives instant actionable feedback on what needs to be done and who needs re-teaching. It also enables a teacher to know which students have mastered a skill.

Personalized learning

Personalized learning is a type of learning which tailors instruction, expression of learning and assessment to each student's unique needs and preferences.

In personalized learning, students take ownership of their learning goals and outcomes in both independent and group settings. It allows for students to make choices about what they need to do next to meet specific learning targets.

ICT plays a big part in the success of personalized learning because it allows the differentiation of instruction, assessment and expression of learning as well as the collection of student data.

Mobile learning (m-Learning)

Mobile learning is a new way to access learning content using personal electronic devices like phones, tablets and laptops.

With mobile learning, you can learn wherever and whenever you want.

In mobile learning, texts, audios or videos are put online and participants access them.

Participants can be given assignments after reading the text, listening to the audio or watching the video.

Mobile learning provides immediate feedback and is very effective when training large groups.

Advantages of mobile learning

1. Pupils learn wherever and whenever. It is possible to lay in bed and watch a lecture or complete a survey.
2. Different types of content are used. You can add videos, audio files and images with mobile learning. Videos make it possible to make learning livelier and more interesting.
3. Long distance is not a problem. Wherever you are, it is possible to view the same content and take the same test.

Disadvantages of mobile learning.

1. Mobile devices can be great distraction for students.
2. Using mobile devices for learning may be an issue if you do not have internet connection and electricity readily available.

UNIT III

ICT for professional support and development

THE CONTENT TO BE COVERED ARE:

1. Teaching and learning with ICT: Overcoming the challenges of being a 21st century teacher
2. ICT tools for administration and monitoring pupil progress
3. ICT tools for professional development

Teaching and learning with ICT: Overcoming challenges of being a 21st century teacher.

(Introduction)

Today's age of 21st Century and it is also the age of information and technology (IT). Every aspects of life are related to science and technology. Huge flow of information is emerging in all fields throughout the world. Now information and technology is popularly using in educational field for making teaching learning process successful and interesting for students and teacher both. In 1998, UNESCO World Education report refers about student and teachers must have sufficient access to improve digital technology and the internet in their classroom, schools, teacher educational institutions. Teachers must have the knowledge and skills to use new digital tools to help all students achieve high academic standard. The quality of professional development of teacher education depends on the extent of ICT integration in teacher education programme.

The scenario of the classroom is changing. There is a technological gap between the progress of the society and instructional activities of the teacher in the classroom. If we see in our society on the one hand technology has revolutionized our society and on the other hand the teaching learning activities at school level have remained so far away from technology. In our classroom the knowledge is imparted by the teacher in an ancient way, a teacher centric mode which is most of the time boring and not to gain interest to the student. But present 21st Century's education is student centric education. Students learn from multi sources and for this reason use of ICT & Multimedia is very much essential in educational field and simultaneously teacher's knowledge of ICT and Multimedia also required.

To look at the challenges of the 21st century teacher, we must have a look at the difference between the traditional classroom and the 21st century classroom

Differences between the traditional classroom and the 21st century classroom

Some challenges faced by the 21st century teacher

1. lack of teamwork, empathy, and support between students- With a stronger focus on individual performance, the role of teamwork is diminishing in modern classroom. if students spend the majority of their time working individually.

2. Not enough time to plan-

Teachers often decry the lack of time they are given to prepare, plan and execute all the tasks that are demanded of them. Adapting subjects to a new cohort of students are some of the tasks that teachers would like more time for.

3. Excessive paperwork for data collection.-

In order to build reliable statistics, school and district administrations ask teachers to compile large amount of data. this takes precious time away from preparing quality content for their students.

4. Applying a prescribed curriculum to all types of students.-

Every student is different. they learn at different speeds, and they have their own way of taking in content and remembering it. Problems arise when teachers are expected to apply a fixed curriculum to students with vastly different needs.

The role of ICT in helping the 21st century teacher to overcome challenges

ICT plays an important role in student evaluation

- It helps in improving professional development and educational management as well as enhance active learning of students.
- it helps them in preparation of their teaching and provides feedback
- ICT helps teachers to pass information to students within a very little time
- ICT helps teacher to communicate properly with their students. so ICT bridges the gap between teacher and students
- ICT helps teacher to motivate students and growing interest in learning
- It helps in improve teaching skill, helps in innovative teaching
- Various technology based plans are used to help the teachers for their practice teaching
- ICT helps teacher to design educational environment
- It removes the traditional method of teaching and prepare the teacher to apply modern method of teaching

Types of ICT tools available

ICT tools for administration and monitoring pupils progress

Administration and monitoring of pupils progress is an important part of the school planning. A school should use technological tools available to help in gathering information. These tools help to show mistakes and create path for both learning and improving.

Some examples of ICT tools for administration and monitoring of pupils are; school management software, Edmodo, classDojo, iTunes U, classter, skyward etc.

How ICT tools can be used in the administration and monitoring of pupils in schools

ICT can be used in schools by administrators in the following ways:

- Use of e-media for scheduling/allocation of halls for examinations.
- Dissemination of information in the school through e-kiosk
- Use of e-media by students to apply for school examination
- Use of e-media for the processing and display of results of students.
- Facility for students to make fee payment electronically
- Security management including surveillance cameras
- Attendance management
- Account management
- Use for record keeping.
- It allows for easy retrieval, easy accessibility and dissemination of information.

ICT tools for teachers

Importance of using ICT tools for administration and monitoring of pupils progress

- Quick, insightful and meaningful assessment tracking, recording and data- this helps to reduce teacher workload and use data effectively to gain insights and produce meaningful reports.
- Improves teaching and learning- schools learning objectives, instructional strategies and planning all aligned and in one place, reinforcing one another to enhance learning
- Know how you are performing- compare any data to instantly understand and demonstrate learning and curriculum journeys with ready-made reports to engage all school's stakeholders
- Reduce teachers workload- the simplest and fastest way to record assessment and plan next steps, matched to your curriculum. save time and collect assessment once, use many times.

ICT tools for professional development

The emerging computer technology is gradually covering the entire span of human activity. The role of computer in teaching has more than one facet; they perform the vocational and pedagogic roles.

As teachers interact with these ICT tools, they develop some professional qualities which improves them as a whole.

Professional development refers to the acquisition of skills and knowledge, both for personal development and for career advancement.

Professional development encompasses all types of facilitated learning opportunities ranging from university degrees to formal coursework, conferences and informal learning opportunities situated in practice.

ICT is extremely useful for professional development of teachers and helps the teacher in the following ways:

1. Effective ICT use in education increases teachers' training and professional development needs. However, ICTs can be important tools to help meet such increased needs, by helping to provide access to more and better educational content, aid in routine administrative tasks, provide models and simulations of effective teaching practices, and enable learner support networks, both in face to face and distance learning environments, and in real time
2. It has established a healthy and interactive relationship between teachers, schools, institutions, and universities and enabled teachers to expertise rich resources in cyber space.
3. Pedagogical practices of teachers using ICTs can range from only small enhancements of teaching practices, using what are essentially traditional methods, to more fundamental changes in their approach to teaching. ICTs can be used to reinforce existing pedagogical practices as well as to change the way teachers and students interact.

4. By the exchange of materials through virtual communities, sharing of ideas and experiences and collaborating on projects the ICT can revolutionize the whole teaching profession.
5. ICT provides lifelong professional development for teachers by providing courses in a virtual situation, training in demand, orientation and refresher courses through video conferencing and online.

