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## UNIT 3 LEARNING THEORIES: IMPLICATIONS FOR ICT

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### 3.1 INTRODUCTION

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During the first year of this programme you might have studied the concept of pedagogy and also about learning theories. Hence, you know that pedagogies are guided by learning theories. You also have an understanding of the concept of Information and Communication Technology (ICT), which is the focal point of the first two units of this course. This unit explains briefly learning theories and their implications for use of ICT in teaching-learning process, and projects the linkage among learning theories, pedagogies, and ICT use for instructional purposes.

Why do we need to study the implications of learning theories for ICT use? This is because with increasing access to ICT at educational institutions, and with policies urging teachers to use ICT, there is a possibility of ICT use, being guided by its availability, and the policies requiring ICT use in teaching-learning processes. This type of ICT use treats ICT as the focal point and teaching-learning strategies revolve around the technology in which the institution has invested (Suri, 2008). In such cases learning theories and hence, pedagogy may become subservient to technology use, which assumes the central position in teaching-learning processes, instead of being the means for supporting pedagogies. This leads to the possibility of using even digital technologies just for supporting traditional pedagogies involving information transmission (Laurillard, 2002). The potential of ICT for supporting a pedagogic shift from traditional teaching methods to those that support knowledge construction may not be utilized in such instances. On the other hand, when the focus is on learning theories, ICT is treated as a means to support pedagogy and there are attempts to integrate it seamlessly in the instructional process. Therefore, this unit treats theories of learning as key points and describes their implications for ICT mediated teaching and learning. Subsequently, it states that optimum utilization of ICT depends on the pedagogy,

and hence, the learning theory, which can make learners consumers of information transmitted by ICT, or collaborative creators of knowledge.

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## 3.2 OBJECTIVES

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After going through this unit, you should be able to:

- describe different learning theories;
- explain the implications of behaviourism for using ICT in teaching-learning processes;
- discuss the implications of cognitivism for using ICT in teaching-learning processes;
- explain the implications of constructivism for using ICT in teaching-learning processes; and
- discuss the ways to utilise ICT optimally for teaching-learning processes.

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## 3.3 THEORIES OF LEARNING AND THEIR IMPLICATIONS FOR USING ICT IN EDUCATION

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You, might have studied in the first year of this programme the theories of learning and hence you have an understanding of the behaviouristic, cognitive and constructivist approaches to teaching and learning. Therefore, in this section, we shall briefly discuss them and draw out their implications for use of ICT for pedagogic purpose.

### 3.3.1 Behaviourism

According to the learning theories propounded by behaviourists, learning is a mechanical process of associating stimulus with response, which produces a new behaviour. Again, such behaviour according to some psychologists is strengthened by reinforcement. We shall discuss the learning theories propounded by two famous psychologists namely Pavlov and Watson that consider association between stimulus and response to lead to behavioural change i.e. learning and then study their implications. Thereafter, we shall discuss some theories that emphasise the role of reward/reinforcement to strengthen the desirable behaviour.

- **Pavlov's theory of Classical Conditioning**

This theory suggests that reinforcement strengthens the behaviour arising from connection between stimulus and response. In Pavlov's famous experiment, the dog salivated (response-R) when food (unconditioned stimulus- UCS) was served and a bell (conditioned stimulus-CS) rang simultaneously. Later on, even in the absence of food, only on hearing the bell, the dog salivated. This was because response was made even to the CS after it had been paired several times with UCS. For instance, we stop at red traffic signal even when we are no longer asked to do so because the red light (CS) itself generates the response thus leading to learning.

**Watson's Theory of Learning:** J. B. Watson's theory too like Pavlov's theory says that learning is by association of stimulus (S) and response (R) and that there can even be generalisation of stimuli to which the same response is emitted. Let us go through the following example in this regard.

### Example

Rohan was learning to use the computer. Once he lost the data stored in it as it did not function. He developed a fear for electronic data storing devices as he had generalized the stimuli and reverted back to the use of paper and pen. Later with his teacher's encouragement, he once again started using computer and gradually gained faith. This is because connection between the stimuli and response (data storing devices and lack of trust) had been broken.

We see that the response (distrust) had got conditioned for not only the floppy, which had caused a natural response but along with it also for the other data storing devices, which had not evoked a negative response so far (neutral stimulus).

### Thorndike's theory of learning

Thorndike's theory of learning also involves bonding of S and R but rewarding a certain response fixes it over the others. This is called the law of effect i.e. pleasant experiences lead to learning over unpleasant ones. Repeatedly forming connection between S and R i.e. drill, strengthens the connection (Law of use) while disuse does the opposite (Law of disuse). There is also the 'Law of readiness' that says that learning is possible only if the learner is ready i.e. mature and possesses necessary previous experiences for learning. Above all this theory suggests that learning is goal oriented.

### Hull's Theory of Drive Reduction

According to Hull also, learning involves S-R connection but it is basically need based. Let us study the following example-

Mr. X, a teacher, was not computer literate and did not bother about the fact that his computer lay unused. Later on, when imparting instructions through power point presentation was made mandatory, he felt the drive to learn, which caused a state of disequilibrium in him and initiated and sustained learning.

### Skinner's Theory of Learning

B.F Skinner was also, an associationist who believed that learning takes place through association of S and R. He, however, vouched for the role of reinforcement in shaping behaviour i.e. for learning. Unlike Pavlovian conditioning, which conditions a particular behaviour, in operant conditioning the 'operant', which unlike a response, is unanticipated, and when it is emitted, it is reinforced. **Hence reinforcement is contingent to the emission of the desired response.**

### 3.3.2 Implications of Behaviourism for using ICT in Education

Behaviourists consider learning to be a mechanical process of 'association' of response with a stimulus for producing a new behaviour, i.e. learning. They also emphasize the need for 'practice' for strengthening the association so that the newly acquired behaviour can be performed with speed as well as efficiency, and gains the strength of a habit. For instance, while learning to use a computer keyboard, we gain speed and efficiency with practice. You have also read that behaviourists like Pavlov highlight the need for conditioning the response (R)

through proper reinforcements and enabling the learner to respond to even a neutral stimulus (S) that assumes the strength of a natural stimulus.

Hull’s theory of drive reduction says that learning involves S-R connection but it is directed towards the satisfaction of a need, which in itself serves as reinforcement, while behaviourists like Pavlov, Skinner and Thorndike are of the view that reinforcement provided by an external agency strengthens the S-R connection and thus the desired behaviour. However, Sprinthall and Sprinthall, (1990) say that Skinners’ concept of reinforcement differs from Thorndike’s concept of reward, which is a satisfying feeling or experience rather than something concrete. Apart from the need for reward and practice, Thorndike also emphasized the significance of other factors like the readiness of learners, and goal oriented learning endeavours, for learning. What are the *implications* of these aspects of behaviourism on ICT use in teaching and learning? We are listing some of the implications. You may take a critical look at them in the light of behaviourism and add some more.

- 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.

Read the following:

In 1999, as a part of the “hole in the wall” project, carried out in Delhi, a computer was put in hole in a wall in a way that children of a nearby slum could access it. The children started using it and could acquire basic computing skills mostly on their own. The project showed that there can be incidental learning of such skills provided the learners can access suitable computing facility, with entertaining and motivating content and some minimal (human) guidance.

**Source:** Edutopia, February3, 2012).

You may read about this project carried out by Sugata Mitra.

Note the words ‘entertaining and motivating content’ in the box given above. 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. For example- for a game built around a pizza party, children, while playing the game, attend the party and learn to count, add and subtract; there are games for language learning while playing the game; an online squabble game requiring players to create meaningful words, encourages thinking and helps the expansion of vocabulary but sustains their interest by challenging them with cues for word making.

- Reinforcing desired learning experience: Skinner is of the view that teachers can be more effective if they act as behavioural engineers and shape behaviour 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 behaviour. 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.

Use of emoticons for providing feedback. One can find emoticons in smartphones. They are used by people to express their feelings.

Thorndike's learning theory is - behaviouristic – 😊

Pavlov's theory of learning is-constructivist- 😞-Read the text again

### Feedback in self learning material

Why does this unit include 'check your progress' and their suggested answers? The unit has been developed as a Self Learning Material (SLM), which is based on the concept of 'programmed learning'. Programmed learning aims to introduce behavioural change (learning) through suitable learning experiences that are analysed and presented in small learnable units for introducing learning. This unit also includes small segments of instructional content called frames. Following the teaching of a segment, learning is assessed and 'reinforced' through feedback.

- 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 and thereby the termination of the newly acquired behaviour.

### A multiplication drill

$$2 \times 3 = 6 - \text{👍}$$

$$3 \times 4 = 13 - \text{👎 -try again}$$

$$3 \times 4 = 12 - \text{👍}$$

$$4 \times 5 = 20 - \text{👍}$$

- Learning requires readiness in terms of maturity and previous knowledge: Previous knowledge, maturity, interest determine readiness. For example a computer training of the advanced level, requires the mastery of the basics. We need to keep this in mind while selecting/developing content/ learning experiences for our learners. Therefore, while developing an audio/video programme we need to carry out a need survey to understand the academic background of the target group (learners) and pitch the difficulty level of the programme accordingly. For example for a video programme on "states of matter" for fifth standard students will you include content on the molecular structure of water? Why?
- 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.

Behaviouristic approaches are criticised as they lead to the adoption of traditional methods of teaching requiring information transmission through lectures for filling

gaps in learner's knowledge. Learners are also engaged in drill and practice for strengthening the S-R association, but not in the generation of new concepts. It also considers learning as an individual instead of a social process and hence, does not take into account the need for discussions and team work for learning. Nevertheless, behaviourism has led to the development of important instructional technologies, tutorials with individual instructions and feedback that reward learning and motivate learners (Shield, 2000; Sutton, 2003). It has also led to the idea of programmed learning, which is still popular for developing SLM.

Behaviourism is although criticised for defining learning as a mechanical process of responding to a stimulus, and encouraging teaching through transmission of information for rote learning but it is difficult to dispense with it altogether. Can we avoid learning by S-R association? How do we learn to stop when the traffic signal turns red and start when it turns green? Do we not get conditioned to stop at a red signal? Can we avoid rote learning? How do we learn our telephone number, our address, songs of a language we may not understand? Do we learn these things by attaching meaning or by rote? Does practice help in learning the use of the computer commands like 'Ctrl+s, Ctrl+b, Ctrl+alt+del'? We learn many things through association, conditioning and repeated practice. S-R association is required even for operating complicated machines like car, computer, aeroplane, mobile phone, and the like. Look at your television remote control device, or your mobile phone. They have many symbols to which you have learnt to respond for operations like increasing or decreasing brightness, volume of audio, and so on. Therefore, when you develop a CD or an online course, you may create various icons for communicating messages like 'forward', 'backward', 'pause', 'start', 'skip', etc., but an icon should require the same response every time it is used so that the S-R connection is established. For instance, if an icon is used once for 'pause', every time it has to be used for pause so that users associate the action 'pause' to it.

### 3.3.3 Cognitivism

Associationists view learning as perceptible change in behaviour and emphasize what learners do. They advocate for S-R and R-S patterns of learning but neo-behaviourists go beyond this and include besides overt behaviour, the internal processes involved within the organism (O) thus making S-O-R combination (Parson, Hinson and Brown, 2001). For instance, learning by observation where by the process is observed and understood and thereby learnt. For example, one can watch a video programme with demonstration of an experiment and repeat it by grasping the content and without resorting to random trial and error. Thus learning is not considered as a mechanical process but requires the application of insight and involves thought process i.e. cognition of the learner. Mental processes like memory, reasoning, organizing ideas, making strategies for acquiring facts and concepts are needed for learning (Seifert, 1991). This requires one to consider the entire field of operation i.e. the problem in its entirety and not isolated stimuli. Hence it is also called gestalt (whole) theory of learning as the learner considers the whole field with all the variables involved and perceive their relations.

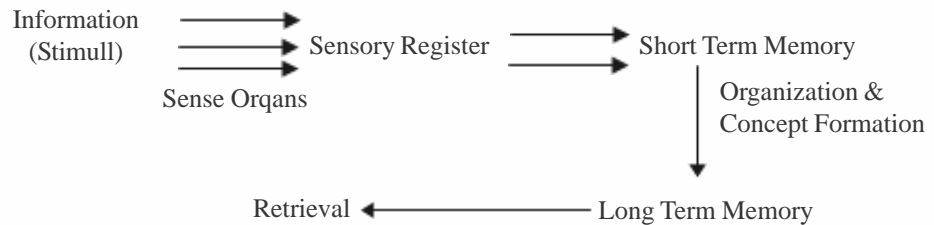
### 3.3.4 Implications of Cognitivism for using ICT in Education

You have studied Piaget's view on acquisition of knowledge, and hence about the growth of the mental structure, the schema (building blocks of knowledge).

While associationists view learning as perceptible change in overt behaviour exhibited as response (R) to stimulus (S), and place emphasis on what learners 'do', neo-behaviourists go beyond this and include besides overt behaviour, the internal processes involved within the organism (O) for making S-O-R combination (Parson, Hinson and Brown, 2001). Therefore, cognitivism does not view learning as a mechanical process but a process of thinking i.e. cognition for meaning making. Mental processes like memory, reasoning, organizing ideas, making strategies for acquiring facts and concepts are needed for such learning (Seifert, 1991) and this requires the consideration of the entire field of operation (gestalt) and the relation among the variables comprising it, instead of considering isolated stimuli. Information processing is thus carried out and as indicated in Figure 3.1, the following steps are therefore essential:

- Receiving initial sensory input from sense organ(s) : The sensory register receives the information but holds it for a short duration and retains only the stimuli to which we pay 'attention'. Objective qualities of the stimuli i.e., well defined features of the stimuli facilitate its retention. For example, a teacher points to Assam in the political map of India and taps the pointed end of a stick on it to draw attention to the stimulus; on a website some links are labelled as 'new' and the word 'new' blinks to draw attention. While the information is still in the sensory register, we perceive it by attaching meaning to it. From the sensory register the information perceived passes on to the 'short term memory' but remains there for a limited period. Thereafter it is either forgotten or becomes long term memory. Hence, information processing is not merely the process of shifting information from sensory register to STM and then to LTM but it also involves the organization of the information and attaching meaning to it for forming concepts (Sprinthall & Sprinthall, 1990). For example, when a child learns about sparrows, the information is transferred to her STM and she makes meaning with the help of her earlier learning of crows and pigeons and her new learning then becomes a part of her LTM but a telephone number she has learnt may be retained in the STM only till she has dialled the number. The learning does not become a part of LTM in this case.
- Transferring STM to Long Term Memory (LTM) as well as recalling the LTM requires effort, but practise lessens the effort. For e.g., unlike those teaching a particular content every year, others who had learnt it long back may need some time to recall it.

Can rote learning be a part of LTM? You know that rote learning, unlike meaningful learning, implies learning by repetition rather than by comprehension. Although such learning is not considered to be as effective as insightful learning but rote learning may also be transferred to LTM and may become life long memory, like the rhymes and songs we had learnt in our childhood often without understanding their meaning. However, we may not be able to recall the 'laws of motion' we had learnt as adolescents if we had learnt them by rote. This is because like the rhymes and songs we may not have fully understood the laws but unlike the rhymes we may not have rehearsed them to the point of 'over learning' i.e. repetition, which is necessary for transfer to the LTM and retention.



**Figure 3.1 Information Processing Model**

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

- 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 s/he 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.
- 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.
- 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.
- 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 teachers usually are the main users of ICT and learners remain passive.
- 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.
- 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.
- 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, focussed 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.

- 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.
- 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 practising it will lead to perfection and naturalization.

**Check Your Progress**

**Notes:** a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

1) For designing an online course does behaviourism have any implications?

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2) How should the instructional content be designed for programmed learning?

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3) What are the features that learning material should have, for fostering thought process?

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### 3.3 5 Constructivism

For the modern educationist, education is much beyond memorizing facts and performing fixed operations. It is ‘metacognition’ which refers to the ability to understand and manipulate cognitive process through questioning, planning, regulating thought and thus perform critical thinking (Parsons, Hinson and Broom, 2001). In the new paradigm of education wherein technology is getting integrated, **construction** of knowledge gets promoted. The learner constructs knowledge through his/her own efforts rather than being fed with fixed information from an outside agency. Intimately related to constructivist approach is the ‘**Humanistic approach**’ which places the learner at the centre stage and allows learning at one’s own pace and style. There is faith in the learner’s potential and allows the learner to fully exercise and use the potential. These approaches are adopted when technology is integrated as the learner occupies the centre stage. Moreover, not all learners will try to construct knowledge in the same way as would have happened if a teacher would have spoon fed them with the same information. Thus, educational technology nurtures creativity and helps in overcoming a straitjacketed approach.

### 3.3.6 Implications of Constructivism for using ICT in Education

You know that as per the constructivist approaches learners should not be merely recipients of the knowledge constructed by others but they should engage in activities that lead to knowledge construction. You also know that social constructivists like Vygotsky consider learning to be a social process requiring discussion, negotiation, attaining consensus, and hence team work. ICT has the potential to support collaborative knowledge construction (Jarvela, Hakkarainen, Lipponen, & Lehtinen, 2001) and Web 2.0 technologies like wikis, blogs and podcasts if effectively deployed can enhance learning experiences, and deepen levels of learners’ engagement and collaboration within digital learning environments (Boulos, Inocencio & Wheeler, 2006). This is because sociability aspects of Web 2.0 tools built through their social softwares make them ideal for educational purposes as they can support conversational interaction, feedback and social networking (McLoughlin & Lee, 2007).

What are the implications of constructivism for teaching and learning with ICT? Some of them are the following:

- **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.
- **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.

- **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 channelize such informal and unguided practices for collaborative creation of content?
- There is an emerging need for pedagogies that harness web 2.0 technologies to promote collaborative learning (Safran, Helic, & Gütl, 2007). 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.
- **ICT use for situated learning:** Situated learning is a form of authentic learning that happens in real world situations. Working in the real world situation leads to the acquisition of knowledge that is embedded in the situation, as well as the application of such knowledge to the real world complex problems emerging in the situation. For instance, while working at schools you may come across a problem related to classroom management that you had not studied during teacher education. You may learn to manage it and also apply your learning in similar situations. This type of learning is contextualized and technology helps in simulating the situation and creating a micro world that represents the real world. For example, we can learn - to fly an airplane in a simulated situation; the basic operations of mathematics through simulated purchase and sale of goods; to solve problems pertaining to management of organizations by studying the problem, engaging in decision making and reflecting on the outcomes of the decisions.

There are games that have been devised for learning by exploring a topic in authentic setting, collaboration and reflection in an educational scenario that combines mobile computing technologies with stationary computers (Spikol, Kurti & Milrad, 2009). There are also games based on participatory simulation that create a scenario mediated by a set of rules that enable inquiry and experimentation, and while playing them, learners are transformed into players who dive into the simulated situation, which is the micro worlds and learn in-context while playing it (Yin, Ogata & Yano, 2009 ).

- **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; heritage key for learning history and culture, and the like.

- 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.
- 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.

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### **3.4 OPTIMUM USE OF ICT FOR TEACHING- LEARNING PURPOSES**

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ICT mediated teaching and learning may have specific objectives, appropriate content that has been organized well, and there may also be provisions for assessment. These steps are adopted for teaching not only through print medium but sometimes also for online courses that includes files in pdf format instead of printed text. ICT use in these cases, however, supports the behaviouristic approach with traditional lecture based pedagogies that may not promote knowledge construction.

ICT although has the potential for creating learning environments in which learners are self-directed and actively engaged in constructing knowledge but when used only for delivering digitized text, it is only a carrier of information. Hence, a lecture delivered through teleconferencing or a CD with a video, or even information made available through a computer followed by testing only alters the source of information and agency of testing without accommodating the learner's active participation in learning process, and this kind of use encourages individualised learning and fails to tap the potential of technology for interactive and collaborative learning (Laurillard, 1993).

The UNESCO (2002, p.17), however, says that "ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich, student-focused, interactive knowledge environments". ICT therefore has the potential for introducing a shift from traditional lecture based pedagogies to those that support knowledge construction (UNESCO, 2002; 2011). Hence, ICT use needs to be directed for information processing, collaborative content creation and problem solving for reforming instructional practices (UNESCO, 2008) and schools must transform the traditional paradigm of teaching and learning through appropriate use of technology. Which learning theory should guide ICT use for such transformation? Behaviourist approaches will make learners consume information and train them to associate response to stimulus. The UNESCO (2002), therefore, says that for

reforming education, schools should use ICT for practicing constructivist approaches.

Constructivist pedagogies use diversity of viewpoints, cultural experiences, divergent opinion that is best realized through interactions with group members from other cultures, languages and geographies, and the use of ICT like the Internet can support this and move education beyond the narrow type of knowledge transmission (Anderson & Dron, 2011). Hence, we need to see that the Internet is not used merely for downloading information but is also used for collaborative knowledge creation.

According to Lombardi (2007) learning-by-doing is the most effective way to learn but not every activity can be carried out within classrooms, like certain experiments that are too dangerous, difficult, expensive, or even impossible to conduct in the classroom. Lombardi also says that teachers cannot show the cause of an earthquake within a classroom, or take students into the past but ICT can model simulated situations for experimenting, animate objects for showing natural phenomena like the movement of tectonic plates, reconstruct the past, connect learners with experts, and so on but ICT can be used for making abstractions concrete, and for making learning a social process, besides making it a cognitive process. However, for this ICT use needs to be based on the contemporary learning theories that view learning as an active, contextualised and a social process, which is not necessarily a linear one (the view that learning is a linear process organizes learning experiences in a linear sequence like the chapters of a textbook, while in real life, learning experiences are not sequenced thus. For instance, a child living in a desert may not experience the seasons as presented in a textbook and may not learn about monsoon for several years.

How can we use ICT for implementing constructivist learning theories? Some examples of ICT use for this are as follows:

- **Making learning an active and social process:** Asking learners to collect information from various websites will enable them to use ICT but this will make them consumers of information. For implementing the constructivist view point and making learning an active process and social process, learners should be a part of an environment in which they explore knowledge sources as a team, discuss with peers and experts and create knowledge. As a teacher you may create a discussion group, or use web 2.0 technologies like a wiki or a blog for this. Educational games like Savannah have been designed for collaborative learning. This game can be played using a handheld gaming device as children engage in role play as members of a pride of lions and interact with the objects and other lions in a virtual savannah (Owen, 2009).
- **Using ICT for Problem-Based Learning:** Learners may solve authentic problems faced in real life, like the problem of malnutrition in the community. They may collect data about the height and weight of young children of the community in which the school is situated, process it using spreadsheets, and using a wiki develop the report collaboratively and share the findings on a website they have created.
- **Using ICT for cognitive apprenticeship:** ICTs can be used to create learning spaces within which novice learners learn while working with

experts. For example in an online discussion forum, new and experienced script writers may work together for developing scripts.

- **Using ICT use for situated learning:** This involves the use of apprenticeship, coaching, collaboration, authentic contexts, tasks, activities and cognitive tools in real world settings (Brown, Collins & Duguid, 1989). We have already mentioned a few examples of ICT use for such learning like simulated lessons for learning to fly an airplane.
- **For Self-Regulated Learning:** Education is much beyond memorizing facts and performing fixed operations, and involves ‘metacognition’, which is the ability to understand and manipulate cognitive process through questioning, planning, regulating thought and thus perform critical thinking (Parsons, Hinson and Broom, 2001). ICT allows continuous review and improvement of the learning resources created. Hence, ICT tools can be used to develop metacognitive skills and make learners more reflective and self-regulated (Hsiao, 1999, as cited in UNESCO, 2002).

**Check Your Progress**

**Notes:** a) Write your answers in the space provided.

b) Compare your answers with the one given at the end of the unit.

4) What is the main purpose of using projected slides by the teacher during teaching-learning processes? Is it beneficial for ‘learning’ or for ‘teaching’?

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5) In what way should ICT be used for facilitating learning?

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6) Which technologies can support learning in a social context?

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### 3.5 LET US SUM UP

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According to behaviourists learning is a mechanical process of responding to a stimulus that leads to change in the overt behaviour of the learner. Behaviourist pedagogies, therefore, seek behavioural changes like the ability to explain, narrate, differentiate, develop, create, analyze, and so on, that can be assessed. For introducing these changes, information transmission is the commonly used pedagogy. Hence, if the approach to teaching and learning remains behaviouristic, even when ICT is used, it is used for supporting a lecture based pedagogy. For instance, the power point slides made using a computer are usually only the carriers of text, illustrations and so on and at best serve as an alternate channel of communication that can very well be substituted by a chart paper. Such pedagogies do not utilize the potential of ICT for supporting active, collaborative and reflective learning. However, can we altogether abandon behaviouristic approaches? The use of signs and symbols is common even for advanced machinery and we learn to respond to these stimuli. Hence, an online course or a multimedia CD we develop may use symbols for pause, start, going back, forward, next, audio, notice board, assessment results and so on. Similarly, we may develop computer assisted instructions for drill for supporting learning that may not require meaning making but only rote like, names of state capitals, names of geographical features, colours, designs of national flags, national animals, and other such things.

Cognitivists consider learning to be an insightful activity that involves thought process and meaning making. ICT use for presenting advance organisers, linkages to concepts learnt earlier and other relevant concepts, content map and other scaffolding devices is in accordance with this approach. Constructivism too holds that knowledge is not meant for being transmitted but has to be constructed by learners within a social setting. This explains the use of web 2.0 technologies like wikis, blogs, podcasts that include the space and mechanism for discussions with peers and experts and even collaborative creation of artefacts; virtual worlds; simulated learning situations, and the like. Therefore, evolving ICT has the potential to support pedagogies based on constructivist approaches, and as schools are supposed to reform educational practices by introducing pedagogies based on constructivist learning theories, ICT use for teaching and learning at schools needs to be directed to this end (UNESCO, 2002). Therefore, ICT needs to be used for imparting pedagogically sound instructions that enhance learners' activities like communication with content, peers and teachers; collaboration with peers; participation in activities for learning by doing in real and simulated environments; analysis of data; synthesis for drawing inferences, making decisions and the like.

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### **3.7 ANSWERS TO CHECK YOUR PROGRESS**

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- 1) Yes, we need to design instructional content taking into consideration the 'readiness; of our learners; provide pleasing learning experiences, include scope for practice, use symbols intelligently for communicating meanings.
- 2) It should include logically sequenced, small meaningful segments (frames) that are followed by scope for assessment of learning and feedback thereon.
- 3) Links to earlier learning, means for drawing attention like underlining, bullets etc., scaffoldings like a concept map, advance organizers, illustrations, examples and so on, relevant questions, cases, etc. For example a scaffolding technique has been used in the design of an interactive simulation framework for developing a participatory simulation game for collaborative in-context learning, and the scaffolding provided initially is gradually phasing out like the scaffolds of children's bicycles (Yin, Ogata & Yano, 2009). ).
- 4) It can be useful for reminding the teacher to cover the points she wants to teach, project illustrations, highlight the main points. Therefore, it serves more as a tool that supports teaching than learning, and has limited role in encouraging learners' activity, thought process and knowledge construction.
- 5) ICT use for learning rather than teaching and engaging learners in tasks like carrying out collaborative activities involving search for information, organising content, making meaning through discussions and negotiations, creating learning resources, playing educational games, engaging in simulation .
- 6) Web 2.0 technologies like wikis and social media that allow learners to interact, negotiate meaning and develop content collaboratively.

Unit 3 Extra practice: Key. 1 2 epidemic. 3 pollution 4 overpopulation 5 starvation 6 congestion. 2 2 editing. 3 presentation 4 artificial 5 coming 6 order 7 skills 8 interact. 3 2 appropriate. 3 data 4 technological 5 search 6 discussions 7 automated telling. 4 2 information. 3 ink 4 battery 5 word 6 gas-guzzling 7 user 8 search 9 space. 5 2 neat. 3 harness 4 empower 5 value 6 efficient. Unit 3 Revision: Key. 1 2 does it start. In this paper, these three theories are described in short, and implications for realizing online courses are derived. Discover the world's research. 19+ million members.Â unconditional branching to other instructional units and pre-determining. choices within the course. 3- Learners must be tested to determine whether or not they have achieved the. learning outcome. 4- The behaviouristic approach for learning suggests to demonstrate the required. operation, procedure or skill, and to break it down into its parts with. appropriate explanation before learners are expected to copy the desired. Learning theories, which provide a profound coherence and understanding in changing teaching practices and standards, are imperative to the choice and employment of assessment and instructional scaffolding techniques. The paradigm shift of assessment "of" learning to assessment "for" learning has brought diversity to educational practice especially in the propagation of creativity and critical thinking among students. Faculty members are to embrace this challenge of systematization of assessment and instructional scaffolding techniques if they are committed to effective teaching and learning.Â Hence, an analysis on the implications of learning theories to peer assessment and instructional scaffolding. The theory implies that there are varying characteristics of certain periods in relation to mental growth. It is important as teachers that we recognise this and allow for this in our curriculum planning i.e. tailor our teaching/learning to the development stage of the learner. Teaching at upper primary and post-primary levels should aim to progress from concrete to abstract reasoning. This has implications for the sequencing for our teaching, for example beginning with more practical aspects before attempting deductive work. It also underlines the importance of concrete resources to aid expla All three theories have a role to play in educational technology. Learning Theories and Implications for Educational Technology There are a variety of learning theories that have been presented over the past several decades, each proposing different thoughts on how and where learning takes place and how instruction should be"show more content" (Vygotsky and Social Cognition n. d.) Language takes the center stage in this process, with play and imagination also playing important roles.